THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVII. No. 670.] LONDON, MARCH 14, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED GARESFIELD COKE.
RAMSAY'S ORDINARY GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1838. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.
London, at the Lombard Exchange, 39, LOMBARD ST., E.C.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov. 2, 1866.*
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(SUCCESSORS TO SAMUEL CALLEY. ESTABLISHED 20 YEARS.)
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FOR
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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
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16, SOHO SQUARE,
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35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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RETORT-SETTING A SPÉCIALITÉ.
RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
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Retort-Setters sent to all parts of Europe and America.
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LONDON, 1862. CLASS X.
LONDON, 1862. CLASS XXVI.
PARIS, 1867. SILVER MEDAL.
AMSTERDAM, 1869.
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VIENNA, 1873. THE ONLY MEDAL.
MANCHESTER. SILVER MEDAL. 1875.

GEORGE GLOVER & CO.,
MANUFACTURERS OF
IMPROVED DRY GAS-METERS,
WARRANTED TO MEASURE CORRECTLY, AND NOT TO VARY.

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G. G. & Co. having had their premises entirely rebuilt, are now fairly in possession of large and commodious workshops, specially adapted to the requirements of the trade, and they are prepared to execute orders, large or small, with promptness and despatch.

THEY KEEP IN STOCK METERS OF ALL SIZES, UP TO 300 LIGHTS.

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G. G. & Co. have just been awarded a SILVER MEDAL for Gas-Meters and Gas Apparatus at the Exhibition of the "Society for the Promotion of Scientific Industry," Manchester.

SILVER MEDAL, PARIS EXHIBITION, 1867.

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EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

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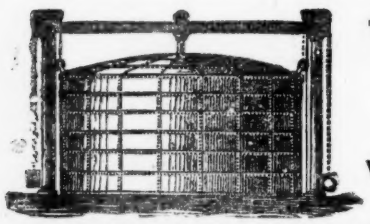

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RETORTS, ANNULAR AND PIPE CONDENSERS,

WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS

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GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

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NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

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For which Estimates will be given on application,

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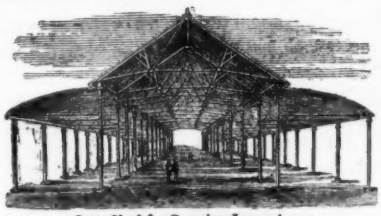

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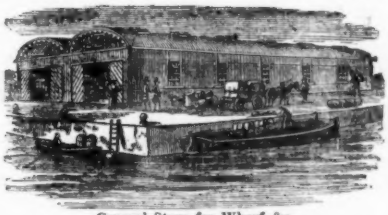

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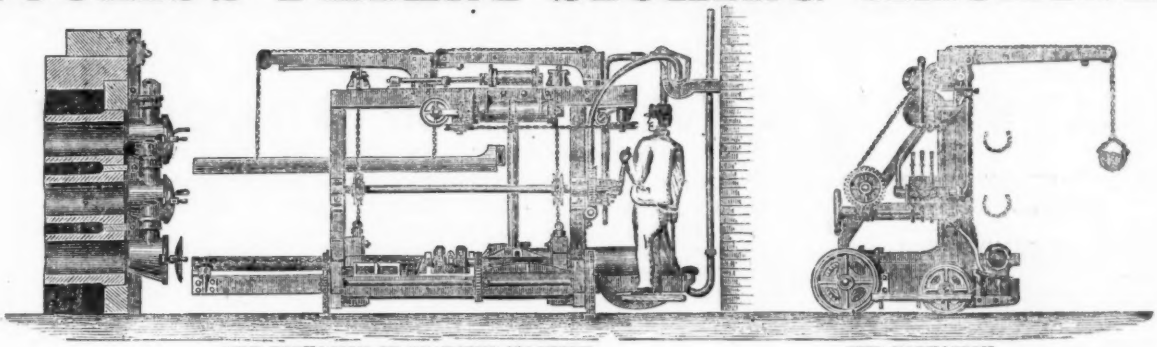
GALVANIZED or PAINTED CORRUGATED IRON ROOFING PLATES and TILES. HEAVY CORRUGATED IRON PLATES for FIREPROOF FLOORS, ROADWAYS, PARAPETS, &c. WROUGHT-IRON TANKS, GUTTERING and CONSTRUCTIONAL WROUGHT IRONWORK.

Designs prepared, and Illustrated Descriptive Catalogue forwarded on application.

LONDON OFFICE: 1, DELAHAY STREET (First door out of Great George Street), WESTMINSTER, S.W.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION.

(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

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WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

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THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

TO GAS COMPANIES, ENGINEERS, &c.

These Works are in full operation, and it will be the aim of the New Company not only to keep up the excellent workmanship of their predecessors, but, by the introduction of special machinery, to manufacture **Meters of a higher standard than is usually given, without increasing the cost.**

Special attention is invited to the Compensating Wet Gas-Meter of De Castro and Burton, which is now becoming so generally adopted, and is more simple in construction than any other Compensating or Ordinary Wet Meter. There is but one centre of friction to be overcome by the gas. By its self-adjusting principle it maintains an unvarying water-line; and the reservoir contains sufficient water to supply the Meter for twelve months without attention. It is unaffected by "tilting," and cannot be "flooded" by any pressure.

The Company also manufacture Dry Meters upon the most improved principle, and all their Meters being made to standard gauges, the most accurate measurement is obtained.

Attention is also called to their Dry Meters in Wood Cases, as used by some of the London Gas Companies. These Cases are a great preservation to Tin-plate Meters, especially in seaport towns, where the air is impregnated with salt; they are also particularly suited for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

JOSEPH AIRD,

WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

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ORLANDO BROTHERS, LIMITED,

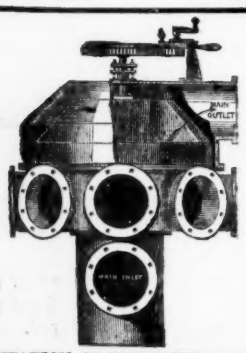
MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

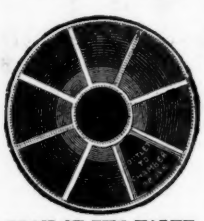
TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS

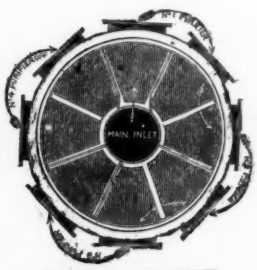
C. & W. WALKERS'
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

KÖRTING BROS.,

STEAM-JET ENGINEERS,

7 & 17, LANCASTER AVENUE, MANCHESTER.

Supplied to—

*Chartered Gas Co.
*London Gas Co.
South Metropolitan Gas Co.
Phœnix Gas Co.
*Liverpool Gas Co.
Bolton Corporation.
*Horsham Gas Co.
*Epsom and Ewell Gas Co.
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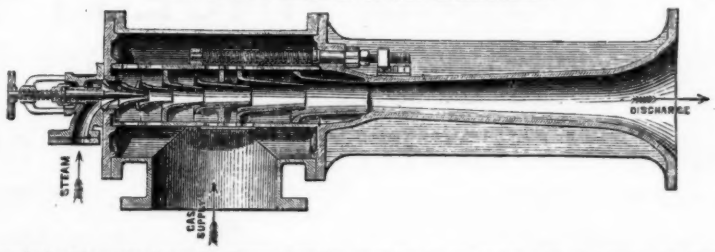
ENLARGED SECTION OF JET EXHAUSTER.

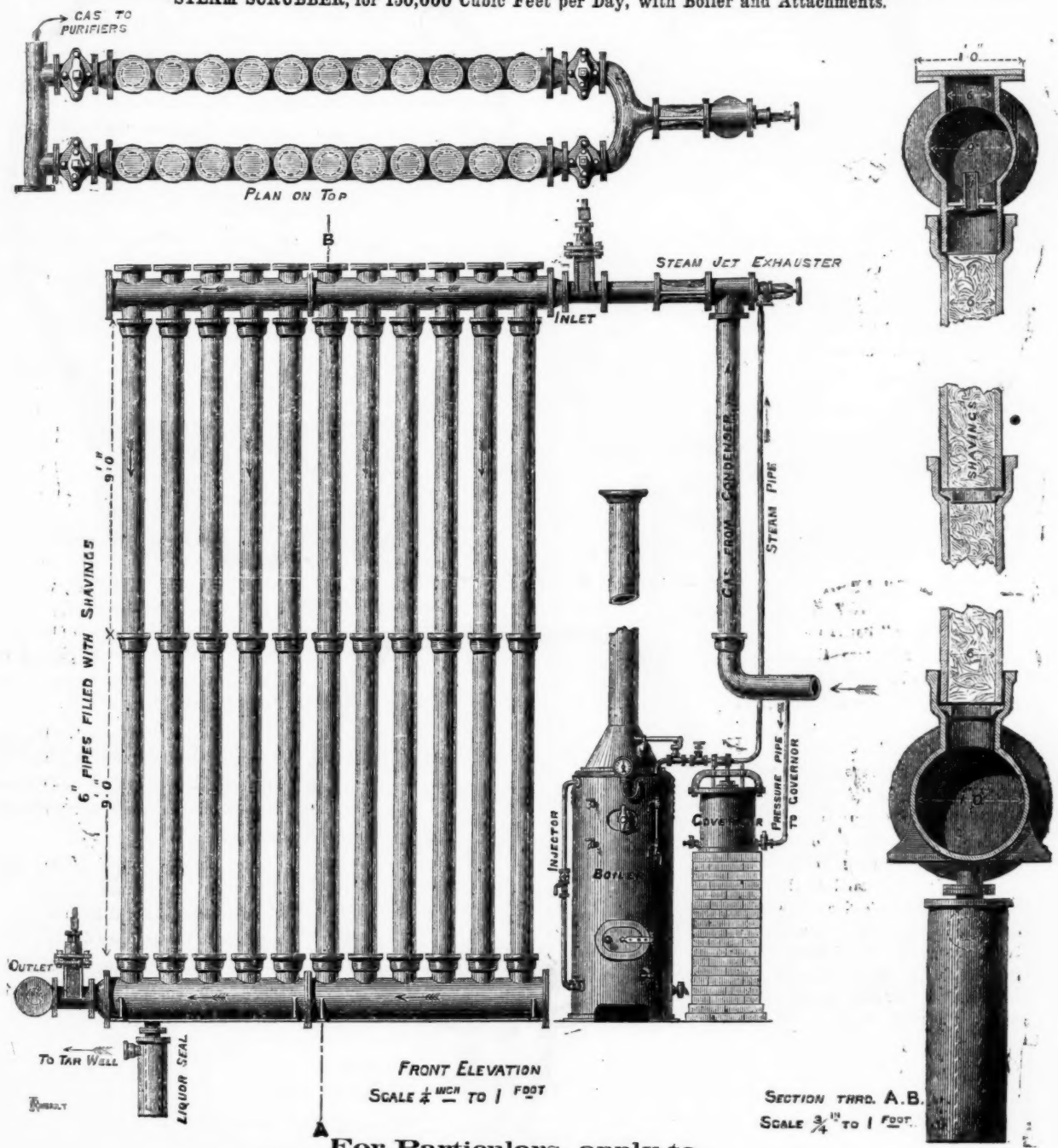


Supplied to—

Cheltenham Gas Co.
*Sandwich Gas Co.
Cornholme Dis. Gas-Works.
Bury Gas-Works.
Glasgow Corporation.
*Leyland Gas Co.
Stalybridge Gas-Works.
*Lincoln Gas-Works.
&c., &c., &c.

Those marked with a star have the Steam Scrubber working in connexion with the Steam-Jet Exhauster.

General arrangement of KÖRTING-CLELAND'S PATENT STEAM-JET GAS EXHAUSTER, with CLELAND'S PATENT STEAM SCRUBBER, for 150,000 Cubic Feet per Day, with Boiler and Attachments.



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GERALD J. TUPP, 8, JOHN ST., ADELPHI, LONDON, W.C., Sole Agent for England and Wales;

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GAS ENGINEER,

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WILLIAM SUGG'S LATEST IMPROVEMENTS IN GAS-BURNERS.

The "LONDON" ARGAND BURNER, with SELF-ACTING GOVERNOR (Patent).

"Westminster" Pattern Shade, as used in the Ministers Rooms and Lobbies of the Houses of Parliament. This Burner is No. D size, and, with a consumption of 5 cubic feet per hour, gives about 2 candles more light than the Gas Referees model, called the No. 1 "London" Argand Burner.

With 5 cubic feet per hour of gas, which gives a light equal to 14·3 parliamentary sperm candles (as tested by the Sugg-Letheby Standard Burner), the ordinary Argands give only a light equal to 10 sperm candles, while the No. F Patent "London" Argand Burner gives a light equal to 18½ sperm candles, or 85 per cent. more light for the same quantity of gas consumed.

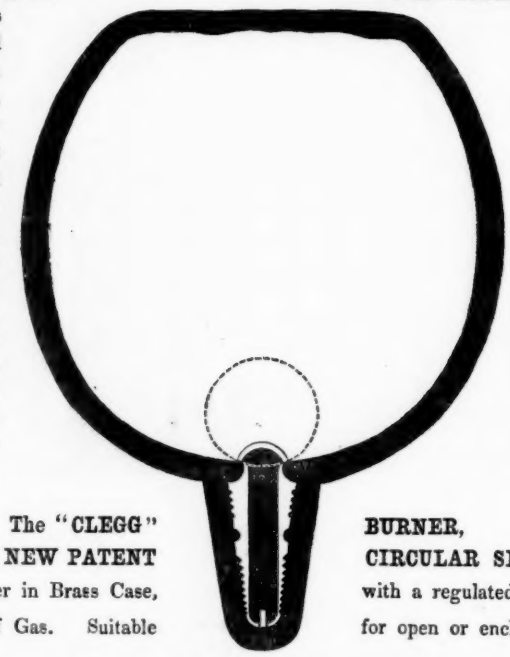
The "CHRISTIANIA" FLAT-FLAME BURNER, with SELF-ACTING GOVERNOR (Patent).

This Burner has been pronounced by the most eminent Engineers of the day to be the perfection of a flat-flame Burner.

The Shades, which are made in a beautiful white glass called Albatrine, are manufactured *exclusively* for these Burners, and cannot be obtained elsewhere.

The light emitted from this Burner is very white and soft to the eyes, and is about 30 PER CENT. superior to the ordinary fishtail.

Numerous other pattern Shades, Plain or Ornamental, may be obtained with these Burners.



The "CLEGG" with the NEW PATENT Is a flat-flame Burner in Brass Case, admission of Gas. Suitable

BURNER, CIRCULAR SLIT, with a regulated opening for the for open or enclosed Lights.

Price Lists and Prospectuses, with description of all the "London" Argand and other Burners, and their proper Shades, Supports, &c., forwarded post free on application.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

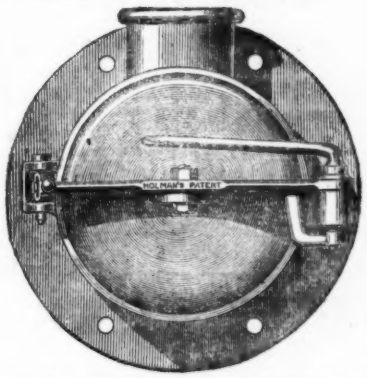
SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

HOLMAN'S NEW PATENT BRACKETED CROSS-BARS,

Anti-Friction Catches and Eccentric Fastenings.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required. Holman's New Self-Sustaining Cross-Bar ensures freedom of joint and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), nearly 20,000 being in use at various Gas-Works in London and the Provinces, among which may be mentioned:—

The Gaslight Co., Beckton (where, by the end of 1875, nearly 4000 were in use).
" Gaslight Co., Bow Common.
" Gaslight Co., Silvertown.
" Gaslight Co., Lupus Street.
" London Gaslight Co.
" Independent do.
" Phœnix do.
" South Metropolitan Gaslight Co.
" Commercial do.
" Imperial do.
" West Ham Gas Co.
" Gas-Works, Barnet.

The Gas-Works, Royal Arsenal, [Woolwich.
" do. Lower Sydenham.
" do. Brentford.
" Consumers Gas Co., Woolwich.
" Alliance and Dublin Gas-Works.
" Edinburgh do.
" Manchester Corporation do.
" Salford do. do.
" Rochdale do. do.
" Liverpool Gas-Works.
" Birmingham do.
" Birkenhead do.
" Nottingham do.

The Newcastle-on-Tyne Gas-Works.
" Lurgan do.
" Carmarthen Gas-Works.
" Merthyr Tydfil do.
" Windsor do.
" Leeds do.
" St. Albans do.
" Over Darwen do.
" Rotherham do.
" Aylesbury do.
" Bournemouth do.
" Ystrad do.
" Cardiff do.
" Rochester do.

The Keighley Gas-Works.
" Aberdare do.
" Ballymena do.
" Richmond do.
" Stalybridge do.
" Longton do.
" Exeter do.
" Ross do.
" Falmouth do.
" Barrow-in-Furness do.
" Belfast do.
" Wakefield do.
And other Provincial and Foreign Gas-Works.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (Commonly called the Chartered Gas Company), Beckton, North Woolwich, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

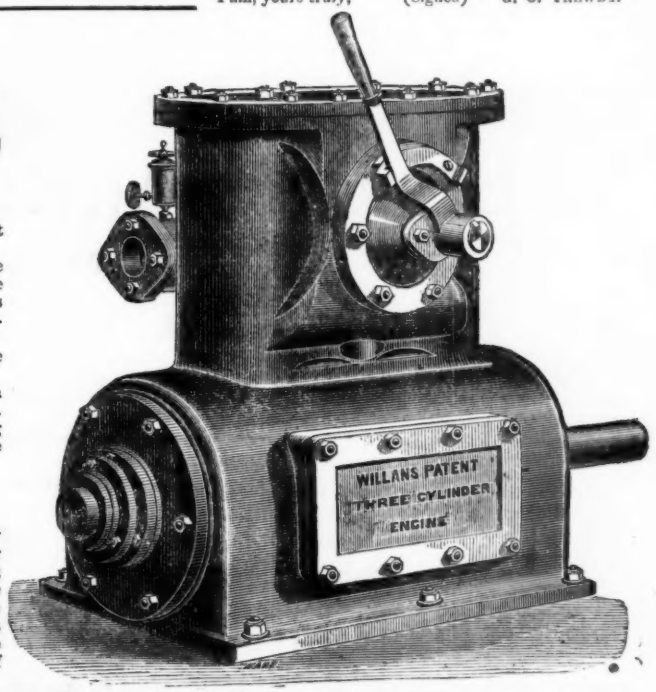
I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly, (Signed) G. C. TREWBY.

WILLAN'S PATENT THREE-CYLINDER ENGINE,

ESPECIALLY SUITED TO DRIVE

GAS-EXHAUSTERS.



This Engine is exceedingly simple in construction, unlikely to get out of order, and can be safely driven by the most unskilful.

No fly-wheel is necessary, there being no "dead centre." The connecting-rods being always in compression, there is no blow on the crank-pin at either end of the stroke, and consequently the Engine is free from the knocking which is nearly always present where double-acting cylinders are used.

All the working parts, being contained in the cylinder casing, are thoroughly protected from injury by dust, &c.

The Engine occupies very much less space than is taken up by an ordinary engine doing equal work; it is also of considerably less weight.

The foundations required for it are of the simplest kind. Driving gear can be attached to either end of the crank-shaft, so that the Engine may at will be made either right or left hand.

From the "Engineer," Oct. 1, 1875.

"Although the engine is only single acting, it will do considerably more work than an ordinary double-acting engine of the same cylinder capacity. There is no thump, no matter how loose the bearings are; indeed, the whole of the bearings may be quite worn out before the working of the engine is affected. It is perfectly noiseless, and the speed at which it can be driven is very great. The working parts can be examined at a moment's notice, by removing the door at the side of the casing. These parts are very few in number, and are of the simplest description."

INDICATED HORSE POWER—At a mean steam pressure of 30 lb. per square inch.	3 H. P.	7 H. P.	15 H. P.	19 H. P.	31 H. P.	53 H. P.
Diameter of Cylinder . . . . . inches.	3	4	6	7	8	10
Length from end to end of shaft-bearings . . . . . "	18	25	36	47	49	60
Breadth . . . . . "	12	15	20	22	27	34
Height . . . . . "	19	20	29	40	42	56
Weight of Engine complete. . . . . cwt.	2¼	3½	8	9	16¼	31
Diameter of steam-pipe . . . . . inches.	¾	1	1¼	1½	2	2½
Price complete, with Reversing Gear	£25	£35	£55	£80	£110	£180
If fitted with Tangye's Patent Governor . . . . . EXTRA.	£6	£7 10	£9 10	£10	£12 10	£14 10

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865 Paris, 1867.

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The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

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3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
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6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
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10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

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(SUCCESSORS TO SAMUEL CROSLEY,)

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AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 14, 1876.

Circular to Gas Companies.

THE Phœnix, London, and Surrey Consumers Gas Companies have presented petitions against the Regulations Bill, and have prayed to be heard by counsel. If precedent be followed, the Select Committee, nominated by the Commons, will be composed of the same members as last year; and, in that case, it may be expected that they will refuse to take fresh evidence, and simply confirm their previous decision. We have more than once expressed an opinion, that the case of the companies was badly put before last year's committee. The parliamentary compact, which was successfully maintained in 1868-9, was not sufficiently insisted upon. It is there that the strength of the companies lies; and in the petitions of the three companies named above, we are glad to see that this point is brought prominently forward. The compact between the local authorities and the gas companies, was entered into in 1860, and the Act passed in that year, placed, for the first time, all the Metropolitan Gas Companies under uniform regulations, as to the quality of the gas supplied. It did not inflict an uniform price, and the injustice of such a proposal is as patent to-day as it was in 1860. But the most important feature of the Act of 1860 was, that it limited dividends to ten per cent., by incorporating the Gas-Works Clauses Act, 1847, and, at the same time, allowed the companies to make a reserve-fund out of profits applicable to dividend.

That the Act of 1860 failed, if it can be said to have failed, was solely due to the supineness of the local authorities, who accepted it as a settlement, but afterwards almost entirely neglected to avail themselves of the powers it conferred. Thus very few set up testing-places, and appointed inspectors or examiners; while, so far as we remember, not one of them ever appealed to the Home Secretary, to set in motion the machinery for the remedy of grievances. It may be, that they had no substantial grievances to complain of, except the price of gas, which, we fear, will always be a grievance until gas is given away.

We have no intention here of tracing the course of legislation since 1860, but must refer to one or two points. Although the terms of the Act of that year may be said to have been settled by the delegates of the local authorities, dissatisfaction was soon expressed at the working of it. The allegation was soon made, that it was much too favourable to the gas companies, and an agitation was commenced by the Corporation of London, to obtain an alteration in the law. In the end, this resulted in the enactment of the Act of 1868—again with the consent and approval of the two metropolitan authorities. It might have been supposed that here the agitation would have ended. But no. It was again soon discovered that this Act, and the Acts subsequently passed in 1869, operated too favourably for the companies, and once more we are plunged in agitation. Certainly, the Phœnix Company are right, when they submit to the House of Commons that, if the Bill now before the House become an Act, "the Metropolitan Board, in the course of another few "years, would quarrel with its provisions, and propose new "measures." They would, most undoubtedly, do so, if the Act advanced the interests of the gas companies. They will look with the greatest complacency on, and indeed would rejoice over, the ruin of the companies; but, beyond all question, if the Regulations Bill become law, and the sliding scale tend to the advantage of the companies, the agitation will be instantly revived.

It is to be observed, however, that up to last year the terms on which the gas companies were allowed to raise new capital had never been disturbed. The parliamentary compact, as we have termed it, was honestly respected. But now we have to face perfectly different proposals. The provisions of the Companies Clauses Act are scattered to the winds, and new shares are to be sold by auction, in place of being divided among existing proprietors. Maximum dividends, in the original sense of the term, are abolished. A price is fixed, and, the cost of coal, iron, and labour permitting, the companies may declare a certain dividend; but in the event of another coal famine, another enormous rise in the price of iron, and another strike of labourers, the dividend must go down. And yet the unfortunate proprietor in gas companies will have had no share in the production of these disastrous circumstances. The state of things which will send down his dividends, it may be to five per cent., may be productive of the utmost good to all the rest of the community; but he (the gas shareholder) must suffer.

Strangely enough, this is called applying commercial principles to gas companies, and what is still more strange, some gentlemen, more or less acquainted with commerce and manufactures, endorsed the notion last year. It was surely without thought. If from any cause whatever, an ironmaster finds the production of iron unremunerative, he can blow out his furnaces. If the manufacture of cotton or woollen goods is not found to be profitable, the manufacturer may work half time, or close his mills altogether; and although thousands may starve in consequence, there is nothing to be said, for only true commercial principles have been observed. But, with statutory gas companies, the case is very different. Whatever may be the price of coal, iron, and labour, they are bound to go on, under penalty, supplying gas to whomsoever, in their district, may ask for it. Under such conditions, is it unreasonable to expect a certain rate of profit guaranteed? If, for example, a certain gentleman had been compelled to keep up a supply of flannel, whatever might have been the cost of wool and labour, would he not have been justified in demanding a guaranteed rate of profit? The fact is, as we have often said, commercial principles cannot be strictly applied to statutory gas undertakings.

But then we have precedent and law to fall back upon. We know past enactments; we know the terms and parliamentary guarantees under which the large capital of the gas companies has been raised, and to alter them will, in the case of some of the companies, involve downright confiscation. The Phœnix Company are perfectly right in putting this strongly before the House of Commons, and we hope that they, and the other two

companies concerned, will push their opposition to the Regulations Bill to the utmost limits. They need not be dismayed by a defeat in the Commons. Let them carry their case boldly to the House of Lords, if necessary, and only yield to the final result.

The second reading of the Regulations Bill has been postponed until the 24th inst., when its rejection will be moved by Mr. Young. It is not usual for Bills of this kind to be rejected on a second reading; but there is a fair chance, if a sharp look-out be kept, and a careful whip made. Recent proceedings on the Metropolitan Railway question have shown us that, a powerful combination may defeat a strongly supported measure, and, therefore, we must advise the gas companies, still opposed to the proposed legislation, to "keep their powder dry." The Regulations Bill ought to be thrown out. We cannot say that it will be rejected; but we have a strong opinion that, if the merits of the case are plainly set before the House of Commons, a decision will be arrived at in consonance with precedent.

We have reason to believe that the scheme for the amalgamation of the Chartered, Imperial, and Independent Companies has been approved by the Board of Trade, subject to some few modifications, about which, we apprehend, no great difference of opinion can arise. It will, then, only require the confirmation of the Privy Council. So much being settled, it may be expected that the Bill of the Imperial Company, which has been read a second time, will be withdrawn, and that of the Chartered Company only, proceeded with. This Bill, although embodying all the essential principles of the Regulations Bill, will be pushed forward independently; and, from the agreement already arrived at, we believe that no opposition will be made to its progress. We still, however, entertain a hope that the Regulations Bill may be defeated, on the motion for a second reading; in which case, probably, the Bill of the Chartered Company would share the same fate; but we confess, that we are not sanguine in this expectation. The opposition to the former, by the other companies, must, however, be pushed with the utmost vigour. If gas consumers fully understood their interests, they would at once pronounce against the sliding scale of dividend, and elect to follow, in any new legislation, the lines of the Act of 1860. To-day, they are somewhat mystified; but they will wake up, with widely-opened eyes, whenever a gas company pay more than ten per cent.

While writing of Metropolitan gas affairs, it is impossible to pass, without notice, the recent decease of Mr. William Newton, who has played such a prominent part in the agitation. The fact that Mr. Newton led the opposition to the gas companies, must not prevent us from paying a just tribute to his great talents, and expressing unfeigned regret at his death. To the Metropolitan Board his loss is irreparable. His great business capacity, large knowledge, and clear, robust eloquence, combined to make him the Premier in the Metropolitan Council; and it will be long, very long, we fear, before another man will be found, who can take the place of Mr. William Newton.

While waiting for the decision of the Referees, on the appeal of the Imperial Company, against the average meter system, as applied in Paddington and St. Pancras, we must not attempt to prejudge the question. By the abstract which we publish in another column, it will be seen that the gas company endeavour to make it appear, that the vestries have actually sustained a loss by the application of the system, and that they might, by making proper arrangements with the company, have effected a considerable saving. Most certainly, by the adoption of a smaller burner, and a curtailment of the hours of burning, the cost of public lighting might be much reduced. But, for our own parts, we are anxious to see the control of the public lights pass, as far as possible, into the hands of the local authorities. If the Referees are convinced that the register of the metered lamps does not fairly represent the amount of gas consumed in the unmetered lamps, an arrangement can easily be made, which will satisfy the just demands of the company; but we sincerely hope, that the meter system, which has given satisfaction everywhere else but in in London, will not be condemned.

We have to call the attention of our readers to a Bill, read a first time in the House of Commons, "to amend," as the title states, "the law relating to the application of Funds of Municipal "Corporations, and other Governing Bodies, in certain cases." This is, in reality, an attempt to repeal portions of the Borough Funds Act, and more especially those sections which make the consent of the ratepayers necessary, for the expenditure of money in opposing or promoting Bills in Parliament. When the Bill is printed, we shall make our readers acquainted with its provisions. At present, we can only advise them to be on the alert, and prepared with petitions against a measure which is promoted in direct hostility to the interests of gas and water companies.

The members of the Local Board of Sevenoaks have taken their defeat, at the recent poll of the ratepayers, so much to heart, that they resigned in a body. A few, however, who go out of office this year, have been induced to remain, to carry on the business of the Board. The election of the new members will, practically, be another poll of the ratepayers, on the question of opposing the gas company. It will, of course, whatever may be the result, be too late to have more than an indirect influence on the decision of Parliament, and we presume the gas company's Bill will pass unopposed.

The committee business of the House of Commons is beginning early this year. Among the first Bills to be taken, are the Ramsgate Gas and Water Bills, the committee on the group containing these, commencing their sittings to-day. We shall give a full report of the inquiry on these Bills, which will possess several points of great interest to companies.

The Town Council of Liverpool have not advanced very far in their attack on the United Gas Company. At their last meeting, the Council passed a resolution, that application should be made to Quarter Sessions, in accordance with section 35 of the Gas-Works Clauses Act, 1847, to appoint an Examiner to make an investigation into the accounts of the company, but rejected a proposal to nominate a local accountant, on the ground that any nomination would be an infringement of the privileges of the Recorder. The investigation, to which the supporters of the company offered no objection, will, of course, be made. The company have nothing to conceal; and, although their proceedings, in the exaction of deposits, have been somewhat harsh, they have the justification, that all they have done has been within the letter of the law. In the course of the discussion, it was stated that, to purchase the gas company to-day, would cost over two millions. If the Borough Funds Act be not repealed, we know, very well, what the ratepayers of Liverpool will say to the expenditure of such a sum.

We may mention, that it was suggested in the Council, that the company should be interviewed, with the hope that they would consent to the appointment of nominee directors. If put properly before them, we have little doubt the directors of the company would give a fair consideration to the suggestion, which certainly offers a means of reconciliation.

We have before noticed the complaints of the gas supplied by the Corporation of Rotherham. These, it is said, have arisen from the defective condition of works, which the Town Council are now proposing to improve and extend. The extension ought to have been made years ago.

Arrangements are in progress, and nearly completed, for the republication, in monthly parts, of the "Treatise on the Science "and Practice of the Manufacture and Distribution of Coal Gas," which is now in course of publication in our columns. The work will be entirely re-written, and much enlarged, and each part will be submitted to the revision of the best authorities on each division of the subject. Numerous illustrations will be added, and no expense or trouble will be spared, by the Publisher and Editors, to make this the most complete work on the subject that has ever been printed.

Water and Sanitary Notes.

The Bill of the Southwark and Vauxhall Water Company has been withdrawn, in deference, we suspect, to the pretty distinct announcement of the Duke of Richmond, that it would be opposed by the Government. For our own part, we can see no reason why the Government should have interfered in the matter; but, probably, the opposition of the several local authorities would have sufficed to cause the rejection of the measure. We presume now that the Vestry of Richmond will soon be in a position to proceed with their works; and the best thing the company can do will be to sell their distributing plant to the local authority. The difficulties of the vestry will, however, now commence. We have no assurance that the means they, at present, propose to adopt will furnish an adequate quantity of water for a satisfactory supply. The quality of the water will, no doubt, be fairly good; but, if the quantity should prove deficient, the vestry will be put to great expense, and, in the end, they may be driven to the much-abused Thames for a supply. After all, perhaps, the vestry would do well to make arrangements with the company, and avoid a debt of £30,000, which would probably be doubled in amount in the course of a few years.

The Town Council of Liverpool have decided not to increase the pumping power at one of their works, in order to test the possibility of obtaining a sufficient supply from subterranean sources, but to remove plugs in the Green Lane well, and work their present engine to the utmost. The increased demands made on our underground stores, and the obstacles placed in the way of their replenishment, are tending, we believe, to the gradual exhaustion of our wells, and clearly show the necessity for impounding rainfall. The result of the experiment at the Green Lane well will be watched with interest, for, on its success, or non-success, depends the question of the expenditure of some two millions to bring water from a distant source to Liverpool.

We are not without hope that the Wakefield Water Company will escape any serious opposition from the Corporation. There appears to be a general desire on the part of the Town Council to avoid a conflict, if it be possible; and, so far as we are able to judge, there are reasonable grounds for compromise. Of course, the first consideration of the Town Council is Wakefield. They care nothing about the outlying districts, the inhabitants of which might die of thirst, rather than St. John's should go without a supply at high pressure. A ratepayers meeting must, of necessity, be held before the council can go further in opposition than presenting a petition, and there is an evident desire to put off this meeting to the latest possible moment. We shall be heartily glad if an agreement is come to, and rejoice to see those awful sums for parliamentary expenses disappear from the company's accounts.

The Town Council of Hastings have become alarmed at the alleged persistent efforts of writers on the London press, to ruin the sanitary reputation of their town, and they have resolved to form a committee of their body, with power to employ eminent medical men and chemists, to demonstrate that Hastings is the healthiest watering-place in the kingdom. The chief allegation appears to be, that the water supply is deficient in quantity; but, if we take the Mayor's estimate of a daily supply of twenty gallons per head, we cannot think the complaints reasonable. It seems certain that an enormous quantity of water runs to waste in Hastings, and, perhaps, it would be well if the Council would put in force all the powers they possess, for the prevention of this waste. There is, it seems, a constant supply in the lower part of the town, and this, with imperfect fittings, gives rise to a leakage of hundreds of thousands of gallons a day.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

LXXXVII.

CONSIDERATIONS AFFECTING THE ESTABLISHMENT OF GAS-WORKS.

Before proceeding further, it may be desirable to enter into the various circumstances which govern the magnitude of a gas-work, as well as the respective apparatus of which it is comprised.

These circumstances principally consist in the geographical position of the town to be lighted, as well as its numerical population; the resources of the locality, either in point of industry or commerce, together with the contract made for supplying the public lights, as well as the cost price of the coal required for the production of gas.

To enter, first, into the geographical position, it must be stated that, at or near the Equator, the days and nights are within a few minutes of like duration throughout the year; but, as we proceed north and south, they are increased and diminished, according to the respective latitudes, until reaching the Poles, where there exists continuous darkness or light, during about six months of the two periods of the year. All towns, therefore, in the respective latitudes have the nights and days of varied length, at any one particular period. Hence the table of the hours of public lighting in each month during the year, which has been reproduced from time to time in several works on gas, is only applicable to certain towns in one defined latitude; and, though accurate for London, would be incorrect for Edinburgh, and still more so for Aberdeen, to say nothing of more distant localities.

It must be observed, however, that in all parts where gas-works are established—whether in the tropics, where the sun rises and sets each morning and evening at six o'clock approximatively throughout the year, or at the north, where the longest night is of 20 and the shortest of four hours duration—there is the same average of 12 hours of day and night per diem throughout the year.

With these points in view, it follows that a work, situated in the tropics, where the consumption of gas is nearly uniform each month throughout the year, is, so far as regards the capacity of the plant and the consequent capital invested therein, placed in a much more favourable position than a work of equal capacity, established in a more northerly latitude.

In the first instance, a given number of retorts are employed, with little variation, throughout the year; and these, once in operation, remain so until rendered useless by wear and tear. The holders and other apparatus are also more limited in capacity, whilst the mains, not being required to deliver a greater quantity of gas at one period of the year than another, are also proportionably small; whereas, in the latter case, a considerable portion of its plant—at least, one-half of the whole of the works—is lying idle during six months of the year, and in many localities, in the height of summer, when artificial light is unnecessary for the majority of the population, the consumption of gas per diem is not equal to the eighth part of that which is required in the depth of winter. Besides this, an extensive part of the plant in northern works is only brought into requisition for a brief period of the year, while the exigencies of the climate, the lengthened hours of the night, the use of gas as a source of warmth in dwellings, as well as for cooking purposes during the day, with the occasional uncertainty of daylight, occasioned by fogs, all tend, at times, to try the capacity of the most complete works. With these differences to be considered, the geographical position of the town to be supplied with gas becomes one of importance.

When designing gas-works for a foreign city or town, the numerical population has frequently been the guide of the engineer; and this without having the opportunity of visiting the locality, or possessing any reliable information concerning the commerce or industry of the inhabitants. In some instances a foreign population has been compared with one of a like number of the United Kingdom. This, however, as experience has generally proved, is very erroneous, for, with the exception of a few European cities and towns, and perhaps some of those of the United States, no fair comparison can be made between the one and the other for the purpose of gas lighting. Nor can this be surprising, when we consider the comparatively low price of gas at home, the industrial character, and the comparative wealth of our countrymen. A populous town or city in some foreign localities may be largely comosed of straw or mud huts, inhabited by the most unproductive, and, consequently, the poorest classes, whose wants and necessities are restricted within the closest limits. These people, although entering into the number of the population, do little or nothing towards enriching the town, and a single manufactory, such as may be found by dozens in the vicinity of Manchester, would do more good towards its progress for gas lighting purposes, than hundreds or thousands of these idlers, who are to be met with in many parts of the world.

Numerical population, therefore, goes for little without a personal knowledge of the town, the number and class of shops, public buildings, manufactories, private dwellings, &c., suitable for the adoption of gas. A foreign town once came under our notice, reputed to have a population of 16,000 inhabitants, with a quay for discharging vessels of 300 tons, yet, in the whole of the place there was not a manufactory of any description; and, although it was the capital of the province, and the port for receiving the products of all the neighbouring country, and was of necessity the mart to supply their wants, it was proved, upon close investigation, that the small number of 200 private lights alone could not be calculated upon. In some countries, however, the Government encourage the adoption of gas for the public lights, which compensates, in some degree, for the limited number of private consumers.

The next consideration is the nature and conditions of the contract for supplying the public lights of a town, which contracts are more variable than is generally known. In most large cities and towns the contract is made for lighting the public lamps from sunset to sunrise every night throughout the year, averaging 12 hours per diem, or 4380 hours per annum. This is the most favourable condition for a gas company, as their mains are thus employed continuously. In other towns, however, the public lighting is suspended on the nights of full moon, and two or three nights before and after, according to arrangement, the rest of the month the town being illuminated during the whole of the night. By another method, in addition to suspending the lighting on moonlight nights, the lamps are extinguished at a certain hour, say twelve o'clock in summer, and eleven o'clock in winter.

Another class of contract for public lighting, although not more profitable than the last, is certainly more onerous for the gas company. By this arrangement, advantage is taken of every hour of moonlight, or, at least, when the moon should appear, and the lighting is either continued to a certain hour or throughout the night. In the latter case, on the night of full moon, and the two preceding and following, the street lamps are not lighted at all, but, on the third night following, as the moon does not rise for an hour after sunset, the public lamps are lighted for that period, and are extinguished on the rising of the moon. The second night, the lighting is extended to one hour and a half, and so on, progressing each day about three-quarters of an hour, until the moon has disappeared, when the town is lighted the whole of the night during fine nights. Advantage is taken of the new moon, and the lights are extinguished as it rises, advancing about three-quarters of an hour each day until the period of full moon.

By this system of contract, the hours of lighting are reduced to about an average of six hours per night, or 2100 hours per annum. Against this supposed advantage, the certified moonlight nights are often of the darkest, for that luminary, even in the tropics, is no more to be depended upon, at certain periods of the year, than the sun in other less favoured climates. Hence, under this arrangement, a town is often left in complete darkness for nights together. Besides, the system naturally gives rise to great inconvenience by the irregularity of the nightly consumption, and the difficulty of enforcing the proper fulfilment of the lamplighters duties. It, moreover, renders a large gas storeage indispensable, so as to continue the operations of manufacture uniformly during the nights that the public lighting is not required, as well as to provide for the extraordinary demand for supplying the successive nights of illumination. The system last referred to is adopted in many towns abroad.

The other consideration mentioned—viz., the price of coal, and the cost of transport of all materials entering into the erection of gas-works, as well as the customs duties levied on these commodities—becomes also a serious question. There are many inland towns having roads which are quite impracticable for the transit of heavy goods, and in which, therefore, the cost of coal is greatly enhanced, necessitating a corresponding increase in the price of gas. Again, there are towns in Europe in which the duty on coal is equal to the cost of the material itself delivered at works in London; and in these places gas can only be supplied at a price at which the modern paraffin lamp comes into formidable competition with it.

We may be excused this digression, knowing the amount of carelessness displayed by *concessionaires* when obtaining a privilege for lighting a foreign town, in neglecting the interests of the company intended to carry the same into effect. In some contracts which have come under our notice, where the undertaking is carried out

with British capital, a fine of double the nightly value of the gas is exacted for every lamp found extinguished, no matter from what cause it may arise. A fine of half the value is made for any "dim" light, and, at times, an arrogant government official will boast of the revenue derived from the gas company by these means. In such cases the government *employé* condemns the company to those fines, and against his decision there is no appeal; so that, unless the manager is empowered to arrange in a "friendly spirit" with this official, the company must be satisfied with their loss. Where such an arrangement is made, a surprising improvement will be manifest in the public lighting, and fines will become almost unknown.

Other sources of loss to a company consist in the low price at which the public lighting is taken, or the condition, sometimes accepted, that the public buildings, and even the public lights, on certain nights of the year, shall be lighted gratuitously. Perhaps, too, no proper guarantee exists for payment when due, and in the absence of this, as recently shown by a correspondent in the JOURNAL, the authorities of the town will allow years to pass without satisfying the company's just demands, and on their refusal to continue the supply, a rival company is invited to oppose them, who also, in the course of time, share the fate of their predecessor.

(*To be continued.*)

SUPPLEMENTARY CHAPTERS.—RETORT-SETTINGS, No. 2.

In the page engraving accompanying this number, figs. 1, 2, 3, and 4, all refer to the same system of setting three clay retorts in a bed, each 15 inches by 12 inches internal measure.

Fig. 1 represents the bed, one half in elevation, the other half having the front wall removed, in order to show the entrance to flues, *o o* (fig. 2), which extend underneath each retort, and communicate with the vertical flues, shown in dotted lines in figs. 3 and 2, and partly in section in fig. 3, and marked L, and in fig. 4 in plan.

The frame of furnace-door is secured by a horizontal bar, P, and bolted at both ends to the buckstaves, T T, this method being sometimes adopted instead of bolts embedded in the brickwork. F is the furnace, the sides being formed of large blocks, which, as already stated, are more durable than bricks, the quality of material in both cases being alike. These blocks possess the further advantage of offering facilities for repairs when the furnace becomes much enlarged by the action of the fire, and the consumption of coke for carbonization is excessive. For carrying these repairs into execution, the furnace being "let down," and cold, the door and frame are removed, and the brickwork of the front wall is cut away, to enable the workmen to remove the blocks, and replace them by others, so rendering the furnace in its primitive state. This done, the wall is built as before, and the door placed ready for action. It should be observed that in "letting down" a setting, the coke of the last charge should always be left in the retorts, the general impression being that this prevents them from cracking.

In fig. 1, *g g* are guard-tiles to protect the lower retorts from the direct action of the fire at these points; *h* is a course of tiles, shown in plan, fig. 4, placed so as to form a flue, *b*, from the back of the retort to the front. There is only one fire-bar of 2-inch square wrought iron, the two bearers being of the same material. The fire-bar projects to the level of the front of the wall, a space existing between the former and the frame of furnace-door, and through this space, as well as underneath the furnace, passes the supply of air to the fuel. This method affords greater facilities for clinkering than when the bar or bars are within the wall, as this can be done at intervals without opening the furnace-door.

Some engineers employ cast-iron furnace-bars, and place four or five of these in the furnace in a similar way to that of a steam-boiler. According to our experience, cast-iron for the purpose has but comparatively limited durability. A further disadvantage of this method is, that the narrow apertures for the passage of the air are speedily obstructed with clinkers, rendering extra labour necessary to remove them. Against this, it may be urged that the wide spaces permit of a portion of the coke falling through, which would be prevented with the narrow spaces, and, to a certain extent, this may be correct; but, as in all well-conducted establishments the residue from the ash-pans has its proper value, no loss on this score arises. Wrought-iron bars, as shown, with one or two in a furnace, are very generally used; and, beyond all question, that material is far superior to cast iron, either for bars or bearers.

In the same figure is represented one of the sight-boxes, as well as a clearing-out box for the flue.

Fig. 3 is a longitudinal section direct through the centre of the bed, showing the arch, J, immediately over the furnace-door, the front wall being 14 inches thick; also the fire-brick lintel, *e*, with the dead-plate attached to the door-frame, which facilitates clinkering.

The top retort is supported by the piers, P P, and their respective slabs. The *massif* is represented of solid brickwork; but this, as before stated, when economy is necessary, can be replaced with fire-brick rubble. It is imperative, however, that all the bricks in immediate contact with the fire should be fire-bricks. L is the flue, at the junction of the two vertical flues.

Fig. 2 is a section through the line B B, all the letters of reference corresponding. The vertical flues, shown in dotted lines, connect the flues *o o* with the main flue, the damper, *d*, closing the communication between the beds and the main flue. The latter, for want of space, is omitted.

Fig. 4 is a plan of the setting, the arch being removed at the points A A, showing the two vertical flues, L L, also the entrances to the two flues, *b b*, formed by the tiles, *h h*, which convey the caloric along the sides of the lower retorts into the flues *o o*, hence to the vertical flues, as indicated by the arrows.

With a setting of this kind no obstruction is offered to the passage of the caloric, part of which is conducted direct to the retorts, the other part being conveyed by the flues, as described, the waste heat being controlled by the damper.

Fig. 6 represents a similar setting to that described, but in this, instead of the retorts being left unsupported at the sides, they are enclosed with 4½ inch walls, built about a foot apart. Some engineers adopt a medium plan, by placing a number of guard-tiles at intermediate distances against the sides of the retorts.

The first four figures represent the manner we have invariably set retorts—that is, so far as possible detaching them from each other, and without cross walls; and although this may be contrary to the opinion of many engineers, we believe it to be the correct method, for reasons about to be given.

An erroneous impression exists that good first-class clay-retorts are compact and free from pores or cells, whereas such articles are exceedingly cellular and friable, and for the purpose of transport, in order to prevent breakage, they require to be carefully packed within battens. The best clay-retorts neither expand nor contract when heated to the temperature necessary for carbonizing coal. Fire-bricks, on the contrary, expand by heat, consequently the arch and brickwork, as shown in fig. 6, when heated, will press against the retorts and cause them to crack. To this circumstance, we believe, is mainly due the breakage of clay retorts; for, as already observed, we have on several occasions taken them out entire, after lengthened active service. These were set without transverse walls, whereas, with them, each retort would, undoubtedly, have been broken into several pieces.

The method of isolating the retorts is very generally applied in works on the Continent, and, we believe, in Scotland, where clay retorts were first practically applied.

It may be observed that there is no other article employed in gas manufacture where excellence is so desirable as in clay retorts, and the fire-bricks of the furnaces, and, in all cases, the best description that can possibly be obtained, should alone be employed, without regard to the slight difference of cost. To demonstrate the importance of this, we may remark that an oval retort, of first quality, 21 inches by 14 inches by 8 feet 6 inches internal measure, will, in its lifetime, carbonize from 300 to 400 tons of coal, producing nearly three to four million feet of gas. But if indifferent retorts are used, which are liable to crack, a considerable portion of the gas may be lost, and, by the expenditure of a few shillings only upon each retort, this might be saved. The best retorts we have met with are sold by *weight*, and they command their price. In England they are estimated at per foot run, the lowest price often commanding the market, irrespective of quality.

We do not pretend, however, that the highest priced retorts are always the best, but, as a rule, a manufacturer who acquires a reputation for excellence of production generally commands his price, and the quality of retorts being assured, a moderate difference in price should never be considered a difficulty to their employment.

Respecting the bricks suitable for the interior of the furnace, it is clear that perfection is one of the greatest wants in a gas-work, and if bricks could be obtained that would last two years, without any appreciable enlargement of the furnace, they would be invaluable.

Fig. 5 shows another system of setting retorts, in which the heat passes from the furnace in the direction of the arrows, up the sides of the outside retorts, and so in to the flue on the crown of the arch, and from thence to main flue. This is similar to Clegg's setting of iron retorts already mentioned. According to this system, the arch represented over the furnace is continued the whole length of the bed, and has five or six nostrils, as represented by N N, on each side, and between these are built the transverse walls for supporting the lower retorts. The centre retort is supported on its pier. The only passage for the heat is, therefore, through the nostrils, up the side of retorts, and so off to the chimney.

BRIDGEWATER WATER SUPPLY.—A company, formed five years ago to supply Bridgewater with water from the Quantock Hills, at an estimated cost of £25,000, have abandoned their intention. The company consisted for the most part of persons in London, but meeting with hardly any support in Bridgewater, they allowed the powers of their Act to expire without commencing the proposed works. The supply, it is said, will now be undertaken by the corporation.

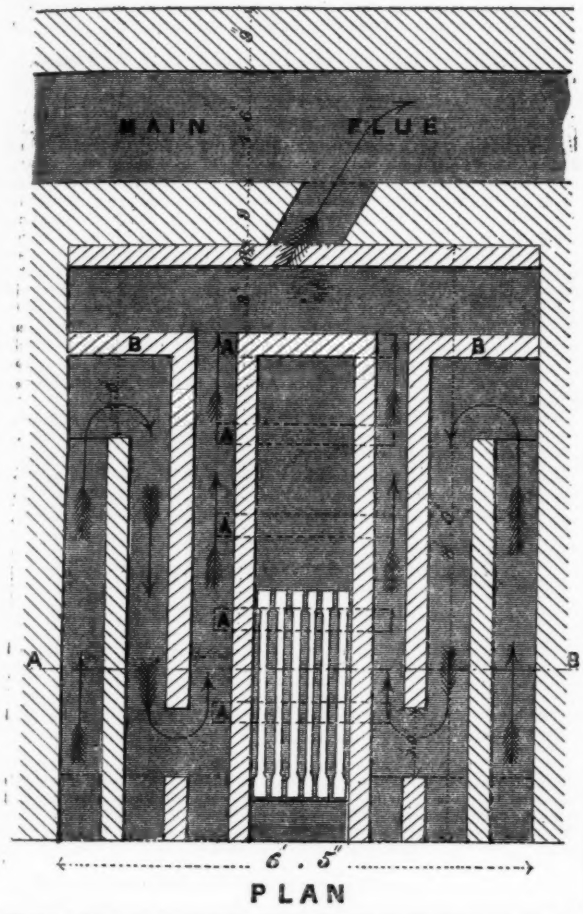
VALUE OF PROVINCIAL GAS SHARES.—On the 2nd inst. 100 shares of £10 each in the Dover Gas Company were offered for sale by auction, in the town of Dover, and realized £1571 5s.; five shares being sold at £15 10s., 20 at £15 12s. 6d., and 75 at £15 15s. each. The present rate of dividend on the shares is 7½ per cent. At a sale in Maidstone, on the 9th inst., 34 shares in local companies were put up to auction. Amongst them were two £25 A shares in the Maidstone Gas Company (fully paid up, and bearing dividend at the rate of 10 per cent.), with half year's dividend, to Christmas last, due on same. They realized £69 each. There were also two £25 B shares fully paid in the same company, paying 4 per cent., and with a half year's dividend due on same, which realized £30 10s. each, and one £25 N share, £5 paid up, and bearing 7½ per cent. dividend, which realized £17.

HOWDEN GAS COMPANY.—The annual meeting was held on the 6th inst.—Mr. H. Tireman in the chair. The report read by Mr. Green, the secretary, gave a very satisfactory account of the position of the company, the rental for the past year being in excess of the previous year by £52 10s. 6d. The directors had, unfortunately, been concerned in a lawsuit with the late manager, Mr. W. Sagden, which had gone through several stages, and was not yet ended. They had already paid £100 on account of the costs of the action; but, notwithstanding these additional expenses, the accounts showed a good surplus, and they recommended a dividend to the shareholders at the rate of 6 per cent. On the proposition of the chairman, seconded by Mr. J. S. Fitch, the accounts were unanimously passed. The retiring directors were Mr. C. Bland and Mr. Robert Kettlewell. Mr. Bland declined being nominated again, and there were three names proposed to fill up the vacancies—Mr. W. E. Miller, Mr. C. Hutchinson, and Mr. R. Kettlewell. Mr. Miller and Mr. Hutchinson were elected. It was resolved, after some discussion, that a sum of 12 guineas should be paid to the directors, as some remuneration for their services during the ensuing year. Mr. Thos. Fitch was elected auditor, and the proceedings closed with a vote of thanks to the chairman.

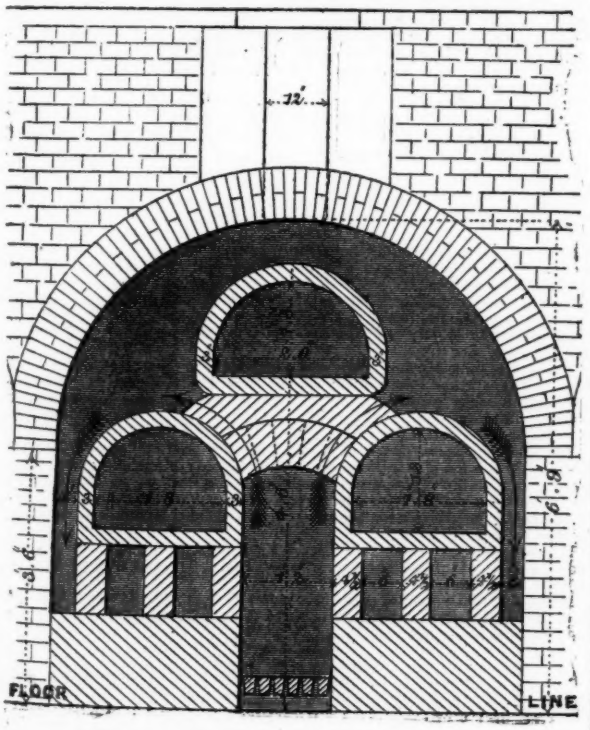
Correspondence.

RETORT-SETTINGS.

SIR,—Seeing in the JOURNAL, some time ago, an inquiry in reference to designs for retort-settings, and as the season for renewing our retorts is fast approaching, I send you the enclosed design, with a hope that it may be of use to some of my brother managers, who may be thinking of rearranging their settings.



PLAN



SECTION ON A.B.

As will be seen from sketch, the design is for a setting of three D-retorts in one oven over the fire. A A, supports for top retort, consist of two rings of arch bricks, which will stand much better than the usual saddle-piece; the wall, B B, is built close up to top of arch, and, if preferred, can be nine inches thick. The spaces in front, on plan, are moveable sights for access to clean flues under two bottom retorts.

This setting has never been tried to my knowledge; but several very similar are at present giving good results, and securing an equal heat over oven.

St. Andrew's. T. HALL.

RETORT FURNACE BRICKS.

SIR,—Will some kind friend inform me what are the best sort of bricks to build the sides of the furnace and the furnace-arch with? I have six clay retorts in one bed, and have to place one retort to rest upon the arch of the furnace. I find before many months the sides of the furnace burn away, the arch drops and comes down, and the retort with it, destroying the retort before it is half worn out. Will ganister bricks stand better than the ordinary fire-bricks? I should also like to know what is the best cement for stopping the cracks in retorts. An answer to the above will be of much service to

A COUNTRY MANAGER.

SULPHUR IN THE PARIS GAS.

SIR,—May I ask you to kindly insert the following letter I have received from the chairman of the Paris Gas Company, on the subject of the alleged impurity of the Paris gas?

I am sure you will consider it due to the Compagnie Parisienne, a most admirably conducted concern, reflecting the highest credit on its promoters and managers; and also to Mr. Livesey, whose well-founded views elicited, in the first instance, the unfavourable comments referred to.

ARTHUR SILVERTHORNE.

1, *Westminster Chambers, Victoria Street, S.W., March* 11, 1876.

[TRANSLATION.]

Compagnie Parisienne d' Eclairage et de Chauffage par le Gaz,
6, *Rue Condorcet, Paris, March* 4, 1876.

Monsieur,—I have read the statement in the JOURNAL OF GAS LIGHTING you refer me to, in your letter of the 16th of February. The writer appears to ascribe to the effects of gas the alleged rapid deterioration of the paintings of the New Opera House, and he concludes from thence that it is urgent to remedy this state of things by improving the purifying processes in use up to the present day.

I do not consider it opportune to discuss, in this instance, assertions which may be more or less conjectural; but that which I can state most emphatically is, that the Compagnie Parisienne du Gaz adhere strictly and particularly, in respect of the purification of gas, to the terms stipulated with the city of Paris in the *cahier des charges*. It is true that the hypothesis may be hazarded that the stipulations are insufficient, and that consequently the gas might therefore occasion injurious effects, without prejudicing the company *concessionnaire*. It is easy to answer this objection, for, when the treaty which binds the company and the city of Paris was ratified, the latter consulted two professional gentlemen whose reputation is universal; and these two eminent chemists, Messrs. Dumas and Regnault, after investigating the subject within all its aspects, decided upon such "practical methods" as they considered best calculated to render the gas perfectly innocuous, whilst affording, at the same time, ample means to secure a continuous check throughout the course of manufacture.

We are, therefore, justified in considering that, for the present, the gas which is supplied from our works affords a sufficient degree of purity, and we think that deteriorations have been attributed to it a little prematurely, which may be due to a great number of other causes.

I remain, &c., &c.,
(Signed) E. CAMUS,
Chairman of the Company.

To Monsieur A. Silverthorne, Ingénieur,
1, Westminster Chambers, London.

GOVERNORS TO METER-LAMPS.

SIR,—Mr. Hall's letter in your issue of the 22nd ult., under the above heading, I was inclined to leave unanswered; but, on second thoughts, I consider the subject of too much importance, and have to request a further favour of space in your valuable columns, to add to what I have already said, and to give him some further "light;" because, were I not to say what I am about to write, his letter of the 22nd ult. would be very misleading to any one who does not know better.

Your correspondent says, "The question still remains unanswered." What question?

Let us go back to his original letter in your issue of the 25th of January, and we find the question written thus: "Mr. Key seems to ignore the duties of that beautiful little instrument, so largely adopted in its many forms, the lamp-regulator, and I would ask Mr. Key, if it cannot *overcome* the reduction of pressure following the use of a meter (which we will say, at the most, is 2-10ths, and with wet meters less), how can it succeed with the ever-varying pressure in our gas-mains? and what advantage has it over a common cock or well-made burner?" To this query I replied in your issue of the 8th of February, and any one who reads it carefully must notice that I have answered all these questions; and I now draw Mr. Hall's attention to the fourth paragraph of that letter, which contains my answer.

But the question in itself is a queer one. He asks "if it cannot *overcome* the reduction of pressure following the use of a meter." Now, this is the point wherein I think Mr. Hall has erred. He has been looking upon this "beautiful little instrument" to do something—to *overcome* something; and thus it is he could not see how it should be called a governor, if it did not succeed.

But we all know that the governor, of itself, has no power to *overcome* anything, because it has to depend, and rest on, the pressure of the gas for all its actions, which pressure is its motor; and, being so, the noting of the action of the pressure on the governor is of the highest importance, and the doing this on those that are in use, and have been in action for a few years, is the proper test—not on a new governor that has never been put to its proper use on the lamp-posts during all seasons.

You must allow me to comment on the apparently reasonable turn your correspondent is now taking, in writing of this matter; the "confusion

worse confounded" is evidently being dispelled, and it is plain Mr. Hall will see daylight through the governor immediately. He and the "governor" may have still a deal to learn, and I sincerely hope he will be the able means of making the "governor" a still more perfect and useful servant.

In his last he speaks of "dispensing with the diaphragm and valve as useless;" also that the name "governor" or "regulator" is misleading. Why? Because, he says, in the "constants" I proposed, I had drawn "very hard lines" for the governor, and that they—the constants—"cannot be, and are, therefore, not attainable."

I am pleased that he has told me these constants are not attainable, and "cannot be," for in this he exactly coincides with my opinion; and on this rests my argument to prove the necessity of making the allowance while testing governors for meter-lamps. That I stated in a former letter.

If such constants were attainable, I have to repeat, the "governor" would not only be a "perfect governor," but also be a "meter," as I before explained, and would pass the exact number of feet per hour it was originally set to pass. But, because such perfection is not attainable, it does not follow that he must lose temper at, or conceit of, the object of his former admiration, and tear out the "heart and soul" and "lungs" also, I may say, of this "fickle fair one."

To dispense with the "diaphragm and valve" would be one way, but I think the wrong way, of getting "light" through the governor, and therefore think Mr. Hall is wrong on this score. Far from doing this, it is my opinion that there would be no better criterion to guide me in judging whether the manager of a gas-work was a careless or wasteful man, than to find, at the present day, our "governors" on the pillars of his public lamps. I showed, in my letter of the 8th ult., that lamp-governors did all I expected of them; and I assert that, with the failing to compensate for the reduction of pressure, and following the use of a meter, it is still "a beautiful little instrument," it does its duty well, it is absolutely necessary in street lighting, and it is best when in a form allowing of immediate access to the weights for repair and adjustment periodically, as I before stated.

And now as to the "constants;" permit me to give my view of these, to confirm any former statement. They may be "hard lines;" but it is only by coming through "hard lines" that we become useful members—and the "lamp-governor," perhaps, will be greatly improved by a little of the same experience; but even should that not be immediately attained, I have little doubt some good will follow from managers giving the care to the application of the instrument which it reasonably deserves.

First, then, as to the "*jets*." Suppose a lamp-governor and jet are fixed together for fitting on a lamp-post, and the governor adjusted to pass, under a given pressure, 5 feet per hour. If in the course of the season, that jet gets larger, the governor is *powerless* to control and reduce the extra volume of gas thus passed to the volume it was originally set to pass. Again, when a lamp-governor and jet are set as above, and the jet gets smaller, the governor is also unable to fully compensate, so as to pass the same volume it was originally set to pass. Iron jets are, therefore, the worst that can be adopted.

Pressure.—Should the pressures not be the same on each of the governors in the district the meter-lamp is placed in, then the governors will not make up the consumption on those having the reduced pressure, equal to the consumption on those having the greater pressure.

Diaphragms of Leather.—The saying has it, "There's nothing like leather;" still we all know that one of its virtues is, its liability to become very soft by wet, as also to become very hard when dry, and it, therefore, can be no constant.

Opening and Closing of Valve.—On a small diaphragm of leather, say two inches in diameter, should the pressure be applied or withdrawn beyond a given number of tenths of an inch the governor was set to work at, it is more than I have found, or expected, that the opening of the cone valve by the yielding of the leather will be such as to be in exact ratio to such variations of pressure, so as to deliver *always* a given number of feet per hour.

I have never looked upon a lamp-governor as a thing sublime or infallible, and am glad to find in your JOURNAL something to bear me out in my remarks. I refer Mr. Hall to the same issue as my last letter appeared in—namely, that for the 8th ult. (No. 665, p. 207), containing a report of a vestry meeting in London, and I verily believe your correspondent would be astonished were he to know how many hundreds of pounds per annum this difference of registration by the difference of pressure on metered lamp-governors would make in that vestry's account alone.

WILLIAM KEY.

Tradeston, Glasgow, March 8, 1876.

DISTRICT GOVERNORS.

SIR,—Having the management of a small work, where the consumption is only 1,360,000, with four miles of mains, which is all on the incline, with a very heavy pressure on the hills, would you kindly inform me, through your valuable JOURNAL, the best and cheapest way to decrease that pressure?

E. J. B.

Denby Dale, March 8, 1876.

[By the use of a district governor, the pressure can, at any given point, be easily regulated to any degree. Such governors are essential in hilly districts.—ED. J. G. L.]

PHOTOMETRY.

SIR,—I have observed a source of error in photometers in which candles are used; and as it appears to have hitherto escaped notice, it will, no doubt, be of interest to your readers. The stand upon which the candles are carried is so arranged, that the centre of the candles is in a line with the index, or the terminal of the bar. This arrangement would be correct if the centre of the candle-flames was always in the same line. As a matter of fact, this can never be so, except when the candles are in a certain position. The apex of a candle-flame is practically in a line with the centre of the *bend of the wick*, and is generally rather more than a quarter of an inch from the centre of the candle. This can readily be seen by turning the candles, when in position, so that the tip of the wick of one, points in the direction of the disc, and the other in an opposite direction. If the basis of the wicks are then brought in a line with the eye, a considerable distance will be observed between the points of the flames.

Readings taken with the wicks of the candles pointing to the disc will differ as much as ·5 (from 8 to 8·5) from those taken when the wicks point in the opposite direction, which means one candle in the result. I am referring to results obtained with an Evans's photometer having a 100-inch bar; the difference would be greater higher up the scale, or with a shorter bar.

The error can be prevented by turning the candles so that the tips of the wicks face each other. The candles should be watched, as the position of the bend of the wicks sometimes shifts during the ten minutes occupied in the testing.

I cannot help thinking that this may account, in some measure, for the discordant results obtained by different operators, and which has heretofore been so difficult to explain.

W. C. YOUNG, F.C.S., Gas Examiner.

Gas Testing Station, Beckton, North Woolwich, March 11, 1876.

GAS-BURNERS.

SIR,—Some years ago a gentleman showed me an improved method of burning gas, which I do not remember seeing noticed in any of the recent experiments made with gas-burners. It consisted of a double socket L-cock, with the sockets cast at such an angle as to cause the flat part of, say, two ordinary fishtail burners, to impinge the one against the other. When expressing my doubts as to any benefit to be derived from this arrangement, he suggested I might test the matter for myself by getting a small piece of block-tin tube, and bending it in the form of a U; then make a small hole at the middle of the bend, to which a burner, with the top cut off, should be soldered, so as to make it suitable for placing in an ordinary L-cock. Upon making a model, as described, and inserting two burners in the ends of the tube—which could be brought together, or kept apart, as desired—I found, when properly adjusted, the illuminating power of the gas was very much increased.

Perhaps some of your numerous readers may be induced to try the experiment, and give us the photometrical value of this system of burning gas, when compared with others.

R. R.

[In Messrs. Audouin and Bérard's "Researches on the Best Conditions for the Combustion of Gas," published in this JOURNAL, Dec. 16, 1862, will be found a table of experiments in this direction.—ED. J.G.L.]

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MARCH 6.

A petition against the Southwark and Vauxhall Water Bill was presented from the Wimbledon District Local Board.

TUESDAY, MARCH 7.

A petition against the Southwark and Vauxhall Water Bill was presented from the Vestry of Richmond.

THURSDAY, MARCH 9.

The Chairman of Committees informed the House that the promoters do not intend to proceed further with the Southwark and Vauxhall Water Bill during the present session.

HOUSE OF COMMONS.

MONDAY, MARCH 6.

The Colne Valley Gas and Imperial Gas Bills were read a second time, and committed.

The Walsall Improvement Commissioners Gas Purchase Bill was read the first time; to be read a second time.

Reports presented, that Standing Order No. 75 has been complied with in the case of the Spennymoor and Tudhoe Gas Bill, and that Standing Order No. 74 has been complied with in the case of the Newcastle and Gateshead Water Bill. Bills to be read a second time.

BURGHS AND POPULOUS PLACES (SCOTLAND) GAS SUPPLY BILL.—Two petitions in favour of this bill were presented from Wishaw.

A petition against the Plymouth Dock (Devonport) Water Bill was presented from the Corporation of Devonport.

TUESDAY, MARCH 7.

The Rossendale Union Gas Bill was read a second time and committed.

The Derby Gas, Folkestone Gas, and Shepton Mallet Water Bills were reported.

Petitions against the Walsall Improvement Commissioners Gas Purchase Bill were presented from (1) South Staffordshire Water-Works Company, (2) Corporation of Birmingham.

The Ramsgate Local Board, Ramsgate Water, Thanet Gas, and Tunbridge Wells Gas Bills were referred to a select committee, consisting of Mr. Bathurst (chairman), Mr. Hayter, Mr. Dundas, and Mr. Cordes; to meet on Tuesday, March 14.

The Gorleston and Southtown Gas, Leicester Improvement, North-East Worcestershire Water, Padiham and Hapton Local Board, Redcar and Coatham Gas, and Uppingham Water Bills were referred to a select committee, consisting of Admiral Francis Egerton (chairman), Mr. Tremayne, Mr. W. E. Denison, and the Marquis of Tavistock; to meet on Thursday, March 16.

The Oldbury Local Board of Health, Smethwick Local Board, Stafford Borough Extension, Tipton Local Board, Walsall Gas Purchase and Borough Extension, Walsall Improvement Commissioners Gas Purchase, and West Bromwich Improvement Bills were referred to a select committee, consisting of Mr. W. W. Beach (chairman), the Marquis of Lorne, Colonel Makins, and Mr. Ralli; to meet on Friday, March 17.

METROPOLIS GAS COMPANIES BILL.—Mr. YOUNG gave notice that on the second reading of this bill he would move—"That it be read a second time upon this day six months."

BURGHS AND POPULOUS PLACES (SCOTLAND) GAS SUPPLY BILL.—Mr. RAIKES gave notice that after the second reading of this bill he would move—"That it be referred to a select committee."

WEDNESDAY, MARCH 8.

BURGHS AND POPULOUS PLACES (SCOTLAND) GAS SUPPLY BILL.—A petition in favour of this bill was presented from Dumfries.

METROPOLIS GAS COMPANIES BILL.—Petitions against this bill were presented from the Surrey Consumers Gas Company and the Phœnix Gaslight and Coke Company.

THURSDAY, MARCH 9.

Report presented that Standing Order No. 74 has been complied with in the case of the Bristol United Gas Bill. Bill to be read a second time.

METROPOLIS GAS COMPANIES BILL.—The second reading of this bill was deferred from March 10 until Friday, March 24.

A requisition to withdraw their petition against the Halifax Water and Gas Extension Bill was presented from owners of mills, &c., and consumers of water in the district of Elland.

The *locus standi* has been disallowed of Edward Whalley as petitioner against the Stafford Borough Extension Bill, and of the South Staffordshire Water-Works Company as petitioners against the Walsall Gas Purchase and Borough Extension Bill.

FRIDAY, MARCH 10.

A requisition to withdraw their petition against the Redcar and Coatham Gas Bill was presented from the Redcar Local Board of Health.

MUNICIPAL CORPORATIONS, &C. (FUNDS) BILL.—This bill, to amend the law relating to the application of funds of municipal corporations and other governing bodies in certain cases, was brought in by Sir Syndey Waterlow, Mr. Mundella, Mr. Morley, Mr. Leeman, and Mr. Dixon, read the first time, and ordered to be read a second time on Tuesday, April 25.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

THURSDAY, MARCH 9.

(*Before Vice-Chancellor* MALINS.)

BRÖNNER *v.* DIXON.

This was a motion having for its object the restraint of the defendants, their servants and workmen, from advertising or offering for sale as "Brönner's" burners, or "Bronner's" patent burner, any gas-burner not manufactured by or for the plaintiff, or any colourable imitation thereof.

Mr. GLASSE, Q.C. (with him Mr. HIGGINS, Q.C., and Mr. ROMER), in opening the motion for injunction, represented the defendant's as amongst a crowd of imitators, some of whom had been stopped by the courts in Scotland, after the fullest investigation. The defendant's were, no doubt, entitled to manufacture and sell their own burners, but they must not use the plaintiff's trade mark, although his patent had expired.

Mr. LOCOCK WEBB, Q.C. (with him Mr. NORTH), said on the eve of the last seal he had given notice that he should apply to the court to cross-examine some of the witnesses; and another notice had since been served to the like effect. The defendants asked that the cross-examination might take place in court.

The VICE-CHANCELLOR said it was now settled that cross-examination could not be heard in court upon interlocutory applications.

Mr. WEBB observed that the notices were given in order that it might not be said the defendant's wished delay. The matter complained of had been going on for twelve months, and had been well known to the plaintiff.

Mr. GLASSE asserted that the notices were given for delay in order to enable the defendants to get rid of their stock.

The VICE-CHANCELLOR inquired whether the burners were marked with the name of "Brönner."

Mr. GLASSE replied in the affirmative.

Mr. WEBB said he had a complete defence. It was quite true the defendants had sold some burners as "Brönner's Patent Burners," but they were part of 15 gross purchased some time ago. But when the plaintiff complained, before the action, the defendants at once said they would give an undertaking to sell no more, and they had not done so. What was now done had been doing for six months at least. The defendants advertised for sale their own burners, under their own names, according to a design which they had registered.

The VICE-CHANCELLOR asked whether the defendants would undertake to sell none under the name of "Brönner."

Mr. WEBB was ready to abide by the undertaking given before this action was brought.

Mr. GLASSE was not satisfied with this, because there was a threat to continue selling what the defendants called their "Registered Improved Brönner's Burner," putting the word "Brönner" in a most conspicuous position.

The VICE-CHANCELLOR said he was under the impression that the defendants might manufacture and sell their improved "Brönner's burner," calling it their own.

Mr. GLASSE said it led the public to believe they were purchasing "Brönner's."

The VICE-CHANCELLOR remarked that, if he purchased "Dixon's Improved Brönner's Burners," it would not convey to his mind the impression that he was buying burners manufactured by Brönner.

Mr. GLASSE assured his lordship that the trade considered they were manufactured by Brönner.

The VICE-CHANCELLOR thought the trade must be very foolish to do so. He considered there must be the right to cross-examine.

Mr. GLASSE said the Scotch courts had decided that the word "Brönner" could not be used, and he reasserted that the object of the defendants was delay.

Mr. WEBB repudiated the insinuation.

Mr. GLASSE produced a Leeds newspaper, in which an advertisement appeared, describing the burner of the defendants as "Dixon's improved burner," and said he had no objection to advertisements in that form.

Mr. WEBB said it was not considered respectful to the court, whilst the motion was pending, to use the word "Brönner;" and, to show his *bona fides*, he would consent to a special examiner at once. At the same time, he was quite ready to meet the motion; and, if Mr. Glasse would withdraw the affidavits, he was ready to proceed.

Mr. GLASSE declined to do so.

The VICE-CHANCELLOR said, if the court were satisfied there was a mere attempt at delay, or that there would be irreparable mischief, it would prevent it; but as the defendants would agree to a special examiner, the motion must stand over. The defendants must continue their undertaking; the cross-examination before the special examiner must be taken forthwith, the defendants paying the expense of the special examiner in the first instance.

Order accordingly.

DUBLIN SOUTHERN DIVISIONAL POLICE COURT.—THURSDAY, MARCH 2.

(*Before Mr.* WOODLOCK.)

RATING OF CORPORATION WATER-MAINS.

The Corporation of Dublin were summoned at the instance of Mr. E. L. Alma, collector of county rates for the barony of Rathdown, for refusing and neglecting to pay to complainant, as collector, the sum of £152 18s. 4d., being the amount of the second moiety of the county rate presented to be levied by the grand jury of the county, at Easter Term, 1875, in respect of the following:—House, offices, and reservoir, at Tupperstown, in the parish of Kill; land for reservoir, in the parish of Rathmichael; land occupied by the water-mains and pipes of the corporation, which are situated in the barony of Rathdown, and the townships of Bray, Kingstown, and Rathmines, and which land is improved in value; besides the occupation and right of laying and keeping and using such mains and pipes, and supplying water therefrom.

Mr. MONROE, who appeared for the plaintiff, said the case had been before the court on a previous occasion, when the late Mr. Dix delivered judgment against the corporation. However, it would be necessary for him to call his worship's attention to the law of the matter again. The first Act bearing on the question was the General Valuation Act, 1873, and the material section was the 17th, because he understood that the question was, would his worship go into the valuation at all. By the 15th and 16th Vict., chap. 63, sec. 17, it was provided that when the valuation of a company was completed, the commissioners should make out the list, and have it posted in public places. The only ground therefore upon which the parties assessing the rate had to go was the valuation prepared by the commissioners, unless an appeal had been lodged, and no appeal had been so lodged. Now, the 19th and 20th Vict., chap. 63 (the Grand Jury Act), provided, "all tolls on roads, bridges, railways, canals, gas and water-works, and all other hereditaments, tenements, and premises, which are liable to rates for the relief of the poor, shall be liable to payment of grand jury rates or county cess, according to the annual value thereof, or the half-rate payable in respect thereof, as contained in the final list of valuation." The Bench had no power to go behind the valuation.

Formal evidence was given as to the valuation, by Mr. *E. L. Alma*, who produced the applotment as furnished to him for levying rates upon the barony of Rathdown, and the warrant, duly signed by Mr. Roche, foreman of the Finance Committee, and countersigned by the secretary; the amount of the applotment against the corporation was £152 15*s.* 4d., on a valuation of £3423; he was now claiming the second moiety, the first having been paid by the corporation. The corporation had paid poor-rates on this property by an order of this court.

Mr. BEWLEY, who appeared for the corporation, submitted that his clients were not liable for these rates, inasmuch as they were a public body, and the profits derived from the water-works were for the public benefit; and, in the same way as the Port and Docks Board were exempted, the Corporation ought to be. However, the Port and Docks Board had the good fortune to get themselves described by the Commissioner of Valuation as being a body existing for public purposes, and were free from all county rates and poor-rates. That question he could not say arose in this case, because the corporation were not described as a public body, nor were their hereditaments described as being held for public purposes. He thought he would be able to show that this applotment was wholly void, because there was no valuation of these water-mains, and this was not a point that could be raised by any appeal. The chairman of the county had decided that no appeal lay whatsoever, and he (Mr. Bewley) contended that there had been no final list of valuation in this case upon which any applotment could be made. There was no power to introduce new hereditaments into the annual valuation, but only (absurd as the law might seem) into the general valuation, made every 14 years.

Mr. WOODLOCK: You say these mains are as new as we will say chloroform or ether is to other remedies?

Mr. BEWLEY: What I mean is, in the county Dublin, the *locus in quo* in reference to which this assessment was made, there was no hereditament similar to these mains existing at the last general valuation.

Mr. MONROE said that argument meant that a railway could not be valued for 14 years after it came into existence.

Mr. BEWLEY said railways were specifically provided for.

Mr. *J. Hurford*, on behalf of the Commissioners of Valuation, produced the book containing the primary valuation of the county Dublin. The valuation was made at different times. For the barony of Rathdown it was made on the 10th of March, 1849; the water-mains were not in existence then, nor the reservoir. The water-mains were first introduced into the valuation in March, 1873, during the revising valuation. In cross-examination, he stated that the surface of the land where these mains are is valued.

Mr. *Carlington*, deputy-clerk of the peace for the county Dublin, produced a copy of the appeal referred to by Mr. Bewley.

Mr. MONROE said that, if the construction which Mr. Bewley put upon the Act of Parliament was to hold good, tunnels through which railways passed might not have any valuation put on them for 14 years after they had been constructed. He would ask, were the tramways not to be taxed for either county cess or poor-rate simply because they had come into operation since the general tenement valuation?

Mr. WOODLOCK asked whether it was the contention of the corporation that, supposing the county of Dublin had the luck of having a coal mine discovered subsequent to a valuation, it could not be valued until the expiration of 14 years.

Mr. BEWLEY: That is the construction of the Act, absurd as it seems.

Mr. MONROE: That is the construction put upon the Act, which is absurd.

Mr. WOODLOCK said he would have very little hesitation in coming to a conclusion, but as there were several sections of the Act to be looked into, he would adjourn the case for a week, and then give his decision.

WEDNESDAY, MARCH 8.

Mr. WOODLOCK gave his decision this day. In announcing the result at which he had arrived, he pointed out that the applotment had been made with due regularity, and had actually been appealed against some time ago by the corporation, but the chairman of the county had dismissed the appeal. The point had, therefore, been virtually decided already by a higher court than this, and had been decided against the corporation. In fact, the late Mr. Dix had, upon this decision, made an order similar to that now sought, and such order he (Mr. Woodlock) would not now think of overruling. He must, therefore, make an order for payment of £153, but would state a case for the Queen's Bench if necessary.

The corporation representative (Mr. BEWLEY) intimated that he would have a case stated.

NEWBURY GAS COMPANY.—At the meeting of the Newbury Town Council on Friday last, it was referred to a committee to consider the propriety of the corporation acquiring the undertaking of the gas company at the expiration of the lease they hold from the town, in about two years time.

WATER SUPPLY OF IQUIQUE.—The concession for supplying the city, port, and district of Iquique (Peru) with drinking water has, we hear, been granted to Mr. George Fitzroy Cole, C.E., F.R.G.S. The concessionaire holds the exclusive privilege for the term of 50 years, and the maximum price at which the water may be sold is fixed at one cent of a sole per gallon (nearly ½d. in English money). The works are to be constructed so as to be capable of supplying 300,000 gallons of water per day, and it is expected that at least two-thirds of this quantity will be immediately required. It is well known that the present water supply is obtained by distilling sea water, and that, owing to the dearness of coal at the port (about £4 per ton), the cost of production alone is never less than 1½ cents per gallon, whilst it is sold at from 2 to 4 cents. The supporters of the undertaking expect to realize large profits by supplying the shipping with water for the homeward voyage to Europe. There were no less than 80 ships loading with nitrate of soda during the month of last October, and there being no present means of obtaining water at this place in sufficient quantity, they are obliged to undertake a voyage to a port distant some 40 miles to the north of Iquique. The right of expropriation of lands in the interior, containing an inexhaustible supply of spring water, is, we hear, contained in the concession. It is understood that negotiations have commenced with the object of supplying the Iquique and La Noria Railway with water, by laying down branches from the principal main. At present the railway experiences very considerable annual expense and loss in the manufacture, pumping, and haulage of water in closed tanks along the line. We may add that for about one-third of the total distance which the water is to be conveyed to Iquique, suitable pipes are already laid, these mains having been put down by the late Barreuchea Nitrate Company, now liquidated. This company was organized for the purpose of conveying to Iquique the nitrate in the form of a solution, instead of conveying it in bulk; the piping performed the work allotted to it, but owing to imperfect appliances used for extracting the nitrate at the port of Iquique the enterprise collapsed. The pipes, however, remain, and it is proposed to turn them to account in carrying out Mr. Cole's scheme of water supply.—*Engineering.*

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone during February, 1876:—

	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 25 Obsers.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	16·57	17·19	15·91	22·05	8·81	32·31	0·73	No trace
Chartered Comp.'s common gas	16·51	16·94	15·90	37·28	14·26	16·39	0·63	No trace
Chartered Comp.'s cannel gas	20·62	21·51	20·26	18·13	10·33	20·30	0·56	No trace

Mean of daily readings of barometer . . . 29·67
" " " thermometer . . . 59·21

* Each observation consists of ten readings of the photometer, at intervals of one minute.

During the month the mean illuminating power of the Imperial Company's gas was equal to the light of 16½ candles; it ranged between 15·91 and 17·10 candles. The mean quantity of sulphur in 100 cubic feet was 32 grains, and of ammonia three-quarters of a grain. The mean light of the Chartered common gas was also equal to 16½ candles; it ranged between 15·90 and 16·94 candles; the mean amount of sulphur found was 16 grains, and of ammonia 6-10ths of a grain. The mean light of the cannel gas was equal to 20½ candles; it ranged between 20·20 and 21·51 candles, and was therefore always above the standard. The mean amount of sulphur found was 20 grains, and of ammonia a trifle over half a grain. The pressure of all three gases was good, and on no occasion was sulphuretted hydrogen detected by the recognized tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London Water Companies during the month of February, 1876. According to these, 110,394,788 gallons, or 501,574 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 210·8 gallons (95·8 decalitres) rather less than a *ton* by weight, to each house, and 29·7 gallons (13·5 decalitres) to each person, against 29·1 gallons during February, 1875. According to returns of the London Water Companies made to the select committee on East London Water Bills (session 1867), it is estimated that, during the year 1866, about 82 per cent. of the total average daily supply of water for all purposes was for domestic use; applying this proportion to the total quantity supplied daily in the month of February, 1876, it appears that about 90,523,726 gallons were probably used for domestic purposes, or about 24·3 gallons per day for each inhabitant, against 23·9 in the corresponding month of last year. This proportion varies from month to month, but the Registrar-General has no means of giving a more exact estimate.

Companies.	Number of Houses, &c., supplied in Feb., 1875.	Number of Houses, &c., supplied in Feb., 1876.	Aver. Daily Supply of Water in Gallons* during Feb., 1875.	Aver. Daily Supply of Water in Gallons* during Feb., 1876.
Total supply	515,552	523,801	106,527,040	110,394,788
From Thames	241,933	246,016	53,830,825	57,055,749
„ Lea and other Sources	273,619	277,785	52,696,215	53,339,039
THAMES.				
Chelsea	28,490	28,600	7,225,400	6,980,600
West Middlesex	46,480	47,506	8,869,168	9,226,178
Southwark and Vauxhall	79,914	80,346	15,520,000	18,600,000
Grand Junction	35,231	36,036	10,440,157	10,078,371
Lambeth	51,818	53,528	11,776,100	12,170,600
LEA AND OTHER SOURCES.				
New River	122,900	124,051	24,217,000	24,672,000
East London	107,294	109,375	21,967,800	22,079,500
Kent	43,425	44,359	6,511,415	6,587,539

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for February, 1876, as compared with that for the corresponding month of 1875, shows an increase of 8249 houses, and an increase of 3,867,748 gallons of water supplied daily.

Dr. Frankland, F.R.S., reports as the result of his analysis of the waters supplied to the Metropolis during February, that, taking unity to represent the amount of organic impurity in a given volume of the Kent Company's water, the proportional amount found in a given volume of the water supplied by each of the other metropolitan companies was—New River 2·9, Chelsea 4·0, East London 4·0, Lambeth 4·2, West Middlesex 4·4, Grand Junction 4·4, and Southwark 5·1. The Thames water supplied during February contained much less organic impurity than that delivered in January, and each of the samples had been efficiently filtered. The Lea water supplied by the New River and East London Companies showed similar improvement, and had been as efficiently filtered. The Kent Company's water, derived from deep wells in the chalk, requires no filtration, and during February it maintained its uniformly excellent quality.

Dr. Whitmore's report on the composition of Thames companies and other waters supplied to Marylebone during February, 1876:—

	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling, in degrees.	Hardness after boiling, in degrees.
	Feb., 1875.	Feb., 1876.	Feb., 1875.	Feb., 1876.		
Distilled Water	0°	0°	0°	0°	0°	0°
West Middlesex	21·24	22·40	0·96	0·96	14·98	3·10
Grand Junction	22·36	22·48	1·00	1·04	15·02	3·12

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water.

	Chlorine in Grains per Gallon.	Parts per Million. Free Ammonia.	Albuminoid Ammonia.
West Middlesex	1·30	0·02	0·08
Grand Junction	1·40	0·02	0·09

Owing to the heavy rainfall of the month, the River Thames at the point of intake of both companies was often very turbid; but the water, as delivered from the companies mains, was generally clear, bright, and well filtered.

THE AVERAGE METER SYSTEM FOR PUBLIC LAMPS IN LONDON.

In the JOURNAL of the 18th of January (pages 92 and 93), we published Summaries of the Reports made to the Vestries of St. Pancras and Paddington upon the working of the average meter system, for the year ending Sept. 30, 1875.

The Imperial Gas Company, who supply both parishes, have just issued the following replies to the statements referred to in these reports:—

AVERAGE METER SYSTEM.—PARISH OF PADDINGTON.

Memorandum on Annual Report of the Gas and Water Committee, for the Year ending Sept. 30, 1875.

The committee state that, by an expenditure of £1845 2s. 8d., for stock, plant, &c., they have saved, in the cost of gas, in one year, as per Table E		£862	10 2
This saving, however, has been chiefly obtained by reducing the number of hours of lighting, which could have been effected by arrangement with the company, without any of the above outlay of £1845 2s. 8d.; in value to the amount of		604	17 2
Leaving a saving for gas, during the year, by the adoption of the meter system, of		*£257	13 0
From this sum there has to be deducted the difference between the amount paid, under the old system, to the company for lighting and repairing the street-lamps, and that expended by the vestry for similar work, together with the cost of repairs and maintenance of meter-boxes, governors, &c., shown in Table C, as under, viz.—			
New System.			
Lighters wages	£1,211 4 9		
Repairs and maintenance of lamps, meter-boxes, &c.	415 14 5		
	£1,626 19 2		
Repaid for private lighting	29 0 0		
	£1,597 19 2		
Old System.			
Lighting	£1,246 18 5		
Repairing and painting	300 19 6		
	1,547 17 11		
		50	1 3
Total annual saving to the vestry under the new system		£207	11 9
This saving has been obtained at the following expense:—			
By an annual proportion of £1845 2s. 8d., expended on stock, plant, and preliminary expenses, and for which no allowance is made in the statement of account—say	£184 10 0		
By inspector's salary	190 0 0		
	£374 10 0		
Deduct as above	207 11 9		
Showing against the average meter system an actual loss of	£166 18 3		
Which could have been saved to the vestry by arrangement with the company for a smaller supply of gas.			

AVERAGE METER SYSTEM.—ST. PANCRAS PARISH.

Memorandum on the Annual Report of the Lighting Committee for the Year ending Sept. 30, 1875.

The committee state that, by an expenditure of £3226 13s. 9d. for meters, &c., they have saved, in the cost of gas in one year, as per Table No. 6		£2865	6 10
This saving, however, has been chiefly obtained by lessening the size of the burners and reducing the hours of lighting, which could have been effected by arrangement with the company, without any of the above outlay of £3226 13s. 9d., viz.—			
By lessening the size of the burner from 5 feet to 4·6 feet	£1033 3 2		
By reducing the number of lighting hours under the old system to those as in force under the new system	1371 8 4		
		2404	11 6
		£460	15 4
The committee's statement of saving is incorrect in some of the particulars given in Table 6, the chief item, a sum of £65 12s. 3d., is an over-estimate as to the charge made by the company under the old contract, by reckoning the number of hours of burning during the year at 4320 instead of 4300 only, for which the company received payment. The errors altogether in Table No. 6 amount to		75	11 6
Leaving a saving for gas during the year by the adoption of the meter system of		*385	3 10
The committee also claim to have saved in cost of lighting, extinguishing, in repairs and maintenance of lamps, as shown in Table 7.	£338 9 6		
They have, however, omitted to state that from that charge was excluded the cost of painting the lamps, and which was formerly included in the company's price; for this deduct	123 6 0		
		215	3 6
Net annual saving for gas, lamp-lighting, and repairs		£600	7 4
This saving has been obtained at the following expense:—			
By an annual proportion of £3226 13s. 9d., cost of meters, boxes, &c., as per Table No. 1	£320 0 0		
By cost of maintenance of meters, salaries, &c., as per Table No. 4	605 4 10		
	£925 4 10		
Deduct as above	600 7 4		
Showing against the average meter system an actual loss of	£324 17 6		
All of which could have been saved to the vestry by arrangement with the company for a smaller supply of gas.			

* These gains, for the past year, are wholly attributable to the fact that the meters do not register to the full extent the gas consumed at the unmetered lamps; and this is only a temporary gain, for the company have appealed to the Gas Referees on the subject, and if a proper allowance is made, as the company expect, the balance against the vestries, by the adoption of the average meter system, will be increased to £424 11s. 3d. in the case of Paddington, and to £710 1s. 4d. in the case of St. Pancras.

DOVER GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 7th inst.—Mr. W. R. MOWLL in the chair.

The directors report was as follows:—

Finding that the works undertaken for improving our manufacturing plant, as stated in our previous reports, were considered by the medical officer of the corporation insufficient to meet the requirements of the law in a sanitary point of view, we last autumn contracted for the erection of two new purifiers, which are now in course of construction. When they are finished, our purifying apparatus will be amply sufficient for the probable requirements of the company for many years to come.

To pay for the new purifiers, and sundry other necessary extensions of the works sanctioned by our engineer, we have ordered the remainder of the new shares created on April 6 last to be sold by auction.

From our reports for several years past you will be aware that the increase of gasholder room has been constantly under our consideration; we have, in fact, postponed it mainly in consequence of the unfavourable state of the iron market. We consider that the time has now come, both as regards the price of ironwork and the quantity of gas supplied by us, when a new gasholder should be constructed; and we have accordingly given instructions for the preparation of plans for the same, to be erected at the Trevanion Street station, which is reported by our engineer to be the most desirable position for it to occupy.

We have to inform you that we have made a proposition to Mr. R. H. Jones for his undertaking, at the expiration of the term of the existing deed of arrangement with Messrs. Anderson and Jones, the office of salaried manager of the works, which has been favourably received by that gentleman, and which, if carried out in the spirit in which it has been conceived and entertained, will, we believe, conduce to the prosperity of the company.

The profit and loss account shows a balance in favour of the company for the past half year of £1922 18s. 6d., and we propose the usual dividend at the rate of 7¼ per cent. per annum.

The directors report was accompanied by the report of Mr. T. N. Kirkham, the engineer:—

I beg to report that the whole of the manufacturing plant and buildings at your several stations are in a satisfactory condition, excepting, as stated in my last report, the gasholders at Trevanion Street, these repairs being in abeyance pending the decision as to the construction of new gasholder.

Messrs. Anderson and Jones, the managers, also reported as follows:—

We have been able to supply a greater quantity of gas during the past half year than has ever been consumed in Dover.

Since Christmas we have enlarged the mains in Park Street, Ladywell, and Buckland Road, resulting in a consumption of gas during the past two weeks of 10 per cent. in excess of the corresponding two weeks of 1875.

The CHAIRMAN, in moving the adoption of the report, said the statements it contained would no doubt be regarded as satisfactory, and during the past half year no complaint had been made either of the price or quality of the gas. Additional capital had to be raised for necessary improvements in the works, and the shares that had been sold were so favourably regarded by the public that they had been disposed of by public auction at a premium exceeding 50 per cent.

Mr. EDWARD BOTTLE seconded the motion.

Mr. ANDERSON directed attention to the fourth paragraph of the directors report, and asked that the correspondence that had passed between the directors and Mr. Jones should be produced for the information of the shareholders.

The CHAIRMAN said that the directors had nothing to conceal, but the secretary was unavoidably absent that afternoon, so that the correspondence could not then be produced.

Mr. FRY (director) said that it was not yet completed.

The CHAIRMAN said the directors had thought it advisable that, when the contract with Messrs. Anderson and Jones terminated, a salaried manager should be engaged, and had made the offer to Mr. Jones, a gentleman whose family had a great stake in the company.

Mr. ANDERSON at some length referred to his own long connexion with the works as partner with Mr. Jones, to the position of prosperity it had now reached, much of which he thought was attributable to his exertions; and, without complaining of the directors, who had a right to do what they thought proper, he pointed out that the interests of the shareholders were likely to suffer from the fact that Mr. Jones was still his partner in several gas companies in Ireland, and could not devote all his time to the Dover works, as his presence in Ireland would be frequently necessary. No two men could have conducted their business more amicably than Mr. Jones and himself had done, but this new proposition would be the apple of discord. However, in the directors point of view, it was a good stroke of policy, as it was dividing Mr. Jones's and his own interest, and there was a time when they polled the shareholders and gained a majority. But now, although he contended that he and his partner did get a majority, he did not want to poll the shareholders. He was a considerable shareholder himself, and had done all in his power to promote the welfare of the company.

After some conversation, the motion for the adoption of the report was put and carried, and the proceedings terminated.

ROCKHAMPTON (COUNTY LIVINGSTONE, QUEENSLAND) GAS AND COKE COMPANY, LIMITED.

The Half-Yearly Meeting of the Shareholders of this Company was held in the Municipal Council Chambers, Rockhampton, on Dec. 21, 1875—Mr. HENRY JONES in the chair.

The CHAIRMAN, in opening the proceedings, remarked that that day was the anniversary of the first lighting of the town with gas, and at that time fifteen persons used the gas. At the present moment 127 were using it. That, he thought, was fair evidence of the progress of the company; and, considering the difficulties they had to overcome, they were in a prosperous condition. They were now assembled for their sixth half-yearly meeting, though only twelve months had passed since the completion of the works. From the commencement of the company's operations the directors had worked together harmoniously and well. The same remarks applied to the secretary and managing engineer, and he thought the company had cause for gratification in possessing two such efficient servants.

The SECRETARY then read the directors report, balance-sheet, and report of the managing engineer, for the half year ending the 30th of November, as follows:—

1. At your meeting in June last, the directors were able to report that the first six months operations had been sufficient to cover all current expenses; and they have now to state that, during the past half year, a profit has been made of £409 12s. 9d., with a reasonable prospect of increasing success.

2. By the balance-sheet, shareholders will see that all bank interest, as well as other expenses, has been met, in addition to the amount shown at credit of profit and loss.

3. In October last, a circular was forwarded to each shareholder proposing to increase the capital of the company by the issue of preference shares, bearing interest at 8 per cent., but very few replies have been received to this proposal.

4. The position and prospects of the company are now fairly assured as a sound and permanent undertaking; but your directors must point out that, in order to secure the amount of success reasonably to be looked for, it is desirable that the capital be increased to provide for extinction of debt, for working capital, and extension of mains and services.

5. An increase of capital to the extent of £5000 (to be called up as required), in the same manner as original shares, is suggested, and either this course, or the issue of preference shares, may safely be adopted with advantage to the company's operations.

6. The reduction in the price of gas has not led to so much additional consumption as was expected, and along the lines of the company's mains there are several householders who have not yet laid on the gas.

7. In order further to induce consumption, the directors desire it to be generally known that no charge is made for meter-rent.

8. In addition to these statements, the managing engineer's report will show the condition of the works, and enable shareholders to form a just estimate of the value of their property, and the progressive and permanent prosperity of the undertaking.

Dr. *Profit and Loss Account for the Half Year ending Nov. 30, 1875.* *Cr.*

Manufacture and distribution of gas and management			£841	5	5		
Interest account			91	3	4		
Profit, May 31			8	5	3		
Profit, this half year			409	12	9		
			£1350	6	9		
						Balance brought forward, May 31	£8 5 3
						Sales of gas, coke, and tar	1319 19 0
						Scrip and transfers	2 5 0
						Rent of dwelling-house	19 17 6
							£1350 6 9

Dr. *Liabilities and Assets.* *Cr.*

A. J. S. Bank					£2639	2 10		
Capital		£10,000	0	0				
Less due from shareholders	£400	1	6					
Less 106 forfeited shares	495	5	11					
		895	7	5				
					9104	12 7		
Profit and loss					417	18 0		
					£12,161	13 5		
							Fixed investment—	
							Land, buildings, machinery, meters, mains, &c.	£11,195 9 8
							Floating investment—	
							Coals, &c.	£627 10 9
							Sundry debtors	296 11 3
							Cash in hand, Nov. 30	42 1 9
								966 3 9
								£12,161 13 5

The managing engineer's report stated that—

The number of gas consumers is now 127, having increased 25 per cent. during the half year. The consumption of gas has increased in a greater ratio. This has arisen from extensions made by old consumers. The gas has been laid on to some of the places of worship, public hall, theatre, and street lamps; and has also been successfully introduced into private houses, and is now used for cooking purposes and motive power. The whole of the carbonizing, purifying, and storeage plant, buildings, street mains, and distributing services, are in good order and condition. For the half year, 174 tons of coal have been carbonized; 1,378,890 cubic feet of gas sold, of an illuminating quality equal to 16½ candles; the coke produced is sold as fast as made; and the coal tar is in good demand. The works have been supplied with water from the corporation mains. The coal-shed has been found very beneficial, and is now fully stored with a supply of coal for the season. The station-meter is now on the ground.

The reports and balance-sheet having been adopted,

Mr. E. S. LUCAS moved—"That the increase of capital advised in the report of the directors, amounting to £5000, be made by creating 1000 new shares of £5 each, such shares to be preference shares, and bearing interest at the rate of 9 per cent. per annum." At the present rate of progress, it would take the company three years to pay off the bank overdraft, and he saw no more expedient way of improving their position than by adopting the course suggested in the report.

Mr. J. MACPHERSON seconded the motion, which gave rise to some little discussion.

The CHAIRMAN, in answer to a shareholder, said, that in all probability several small extensions would be made. In increasing the capital, the principal object in view was to clear off the bank overdraft. At present the company had no capital with which to extend mains, and the bank might come upon them any day for payment of the overdraft.

Mr. FORREST moved, as an amendment to the motion, that the capital be extended by £3000 only.

Mr. PATTISON seconded the amendment.

Mr. LIVERMORE pointed out that although £5000 was mentioned as a nominal sum, it was not necessary for the directors to call up the whole of that amount.

Mr. BELL thought the shareholders might depend upon it that the directors would not squander the £5000 if they got it. He agreed with the proposition to increase the capital, and believed there were many cottages in the outskirts of the town where a large quantity of gas would be consumed if the mains could be extended. It was often the case that in cottages far more gas was used than in shops and warehouses, in which it was burnt only on Saturday evenings.

On a show of hands, the amendment was negatived, and the original motion was carried.

The CHAIRMAN thanked the shareholders present for their attendance, after which a vote of thanks to the chairman and directors, for their efficiency during the past half year, was proposed by Mr. STEVENSON.

Mr. PATTISON seconded it, and wished them success in the negotiation of the additional 1000 shares.

The meeting then concluded.

GAS LIGHTING IN AMERICA.

The *American Gaslight Journal* publishes the following interesting notice, which it states is taken from a copy of the *Columbian Pheniz*, published in Providence, R. I., Nov. 27, 1813:—

"The subscribers, Proprietors of Letters Patent from the President of the United States, for the IMPROVED GAS LAMP, for lighting Manufactories, Mines, Mills, Theatres, Light Houses, and other Buildings, with Hydrogen Gas, or inflammable air, produced from Pit Coal, in a more agreeable, more safe, and less expensive manner than has hitherto been done by any other method, having it now in operation in a building in Newport, R. I., and in the Cotton Manufactory of Mr. *Seth Bemis*, in Watertown (seven miles from Boston), which is now brilliantly illuminated every night with Gas Lights, to the exclusion of every other artificial means, they respectfully invite gentlemen concerned in manufactories, &c., to call and view it in operation, and be convinced of the utility and advantages of this improvement. The Gas apparatus is very simple in its construction, and is so easy in its management, that any person of ordinary faculties may be taught, in one or two operations, to manage every part of it effectually; and the trouble will be found infinitely less than that of trimming and tending lamps or candles to afford the same number of flames.

"The Gas Lights are in no way offensive, but very agreeable to the eye, and will be found extensively useful in every situation where much light is required, especially in *Cotton* Manufactories, inasmuch as they are less expensive than those from tallow or oil, and free from the inconvenience and danger resulting from the sparks and frequently snuffing of lamps and candles; circumstances tending greatly to diminish the hazard of fire, and proportionably to reduce the rate of insurance on buildings and materials subject to that destructive element.

"Contracts will be entered into for furnishing and putting up the apparatus in manufactories, &c., immediately, on terms highly advantageous to them, by applying to "DAVID MELVILLE, *Newport*, or

"*November* 13. "WINSLOW LEWIS, *Boston*.

"N.B.—The Gas Apparatus has just been erected, under the superintendence of the Patentee, at the WENSCUTT MANUFACTORY (one and a quarter mile from the Mill Bridge), which is now illuminated every Evening with Gas Lights. Gentlemen concerned in Manufactories in this vicinity are respectfully invited to call, and see this valuable improvement in operation. An Apparatus for any number of lights can be furnished in ten days after application, as above.

"*Providence, Nov.* 13, 1813."

UNITED GENERAL GAS COMPANY.—At the meeting of shareholders on the 7th inst., the directors annual report, which was agreed to, showed a disposable balance of £1515, from which a dividend was declared of 3s. per share, free of income-tax, leaving £165 to be carried forward.

HEREFORD CORPORATION GAS-WORKS.

At the Meeting of the Town Council of Hereford, on the 2nd inst.—the MAYOR (Mr. Shellard) presiding—

The Gas Management Committee made the following report:—

We have effected a new insurance with the Law Union Fire Office for the sum of £1500, this office including risk by explosion. The office in which the works were previously insured did not include that risk.

We have received from Mr. Sandell his report and accounts for the year ending Dec. 31 last, which we lay before the council. In addition to the information therein contained, the following comparative statement, showing the results of the working under different heads, will be interesting:—

		Rate per Ann. for 1¼ Year to Dec. 31, 1873.		For Year ending Dec. 31, 1875.
Coals carbonized	tons	4,646	..	4,964
Gas produced	feet	48,187,334	..	51,318,000
Gas lost or unaccounted for		6,316,142 or 13·1 per ct.	..	5,936,133 or 11·54 per ct.
Average make of gas per ton of coal carbonized	cubic feet	10,371	..	10,337
Maximum quantity made in 24 hours	ft.	252,000	..	268,000
Maximum quantity delivered in 24 hours	feet	259,000	..	296,000

The average illuminating power of the gas during the past year has been equal to 14·66 standard sperm candles, consuming at the rate of 120 grains per hour, in comparison with Sugg's new "London" Argand burner, consuming 5 cubic feet of gas per hour.

HEREFORD CORPORATION GAS-WORKS ACCOUNTS, DEC. 31, 1875.

(A.)

Dr. *Capital Account.* *Cr.*

Dec. 31, 1874, to loan repaid to date	£1,843	12 9	Dec. 31, 1874, by cost of works and expenditure to date	£53,932	6 3
July 6, 1875, to loan further repaid to date	984	9 11	Dec. 31, 1875, add subsequently expended	1,784	2 1
July 6, 1875, to loans, 1875	1,500	0 0	Balance of capital account (E)	783	11 8
To loan, 1872, balance unpaid	52,171	17 4			
	£56,500	0 0		£56,500	0 0

(B.)

Dr. *Profit and Loss Account, from Dec. 31, 1874, to Dec. 31, 1875.* *Cr.*

Expenditure.			Income.		
Coals consumed, cost	£4,125	19 5	Gas-rental, for public and private lights, for twelve months, to Dec., 1875	£9,268	14 9
Purifying	85	8 4	Residual products, less cartage and expenses—		
General repairs, wear and tear	663	0 10	Coke	993	0 4
Repairs to mains and services	140	14 1	Tar, liquor, &c.	322	3 5
Lamp lighting	156	7 0	Fittings account, profit thereon	131	2 7
Gas-making wages	669	14 3	Abatements	5	4 3
Salaries	347	9 7			
Rates and taxes	632	10 8			
Stationery, printing, &c.	42	17 4			
Law expenses	14	15 7			
Total expenditure	6,878	17 1			
Net revenue account for balance transferred (C)	3,841	8 2			
	£10,720	5 4		£10,720	5 4

(C.)

Dr. *Net Revenue Account, Dec. 31, 1875.* *Cr.*

July 6, 1875, to interest paid on mortgage, to June 30, 1875	1,186	1 0	Dec. 31, 1874, by balance brought from last account	£277	7 3
Dec. 31, to amount of interest accrued and owing to this date	1,164	1 10	Dec. 31, 1875, by balance brought from profit and loss account (B), being profit for twelve months to this date	3,841	8 3
Interest charged by treasurer, less amount allowed on deposit account	4	10 7			
Interest paid on additional loans of £1500	20	5 11			
Do. do. do.	16	7 1			
Do. do. do.	16	0 4			
Loan redemption-fund, for amount transferred to credit account (D)	734	9 11			
	£3,141	16 8			
Balance, surplus to new account	976	18 10			
	£4,118	15 6		£4,118	15 6

(D.)

Dr. *Loan Redemption-Fund.* *Cr.*

July 6, 1875, to cash paid, instalment on loan	£984	9 11	Aug. 6, 1875, by cash from the corporation (Finance Committee)	£250	0 0
			Dec. 31, by net revenue account (C), amount transferred	734	9 11
	£984	9 11		£984	9 11

(E.)

Dr. *General Balance-Sheet, Dec. 31, 1875.* *Cr.*

Dec. 31, 1875, to capital account for balance unexpended (Account A)	£783	11 8	Dec. 31, 1875, by amount owing by debtors for gas and meter rental, including the quarter's rental ending at this date	£2,879	3 11
Dec. 31, 1875, to sundry tradesmen and others, for amounts due for coals, fittings, &c.	1,468	4 9	Less deposits received	10	10 0
Dec. 31, 1875, to interest accrued and unpaid on mortgage, to Dec. 31, 1875	1,164	1 10		£2,868	13 11
Dec. 31, 1875, to amount due to the treasurer	114	19 1	Dec. 31, 1875, by debtors for residuals, viz.—		
	£3,560	17 4	Coke	298	0 9
Dec. 31, 1875, to net revenue account, balance at credit (C)	£976	18 10	Tar	98	6 6
			Lime	5	15 3
			Liquor	10	0 0
			Fittings	391	19 7
			Dec. 31, 1875, by stock of materials, &c., on hand at date—		
			Coals	171	11 1
			Fittings and general stock	535	5 1
			Purifying materials	21	5 0
			Coke	89	7 0
			Tar and ammonia	35	0 0
			Gas	4	4 0
			Dec. 31, 1875, by cash in hands of manager	8	8 6
	£4,537	16 2		£4,537	16 2

DEATH OF MR. T. A. DREW.—Intelligence has reached England of the death, at Pernambuco, on the 1st of February, of Mr. Drew, formerly manager of the Widnes Gas and Water Works. He left Widnes in April last to take charge of the gas-works at Pernambuco. He was accompanied by his wife and family of seven children, who, however, returned to England some months ago. Two of the sons have since died. Mr. Drew, who was only 36 years of age, was deservedly respected by all who knew him.

THE GAS QUESTION AT DEAL.

The following Report by the Gas Committee of the Corporation of Deal has been presented to the Town Council:—

Report of the Committee appointed by the Council to make Inquiries respecting Gas, Public and Private, and to obtain necessary Information for the Council previous to making a Future Contract for the Lighting of the Public Lamps.

Your committee have expended considerable time in obtaining information from many towns in various parts of England. They find the price of gas ranges from 2s. 3½d. to 5s. 10d. per 1000 feet. The price of gas does not appear to be altogether regulated by the price of the raw material, coal. In many towns wherein coal is cheap, the price of gas is high, and *vice versâ;* but the committee find the greater the illuminating power (which in some cases equals 28 to 34 candles) the higher the price of gas, whilst the low standard of lighting power brings down the price proportionately low.

Your committee have, therefore, more particularly confined their observations to two neighbouring towns, where the price of coals, the street duties, and illuminating power of the manufactured article is comparatively the same—viz., Folkestone on the one side, and Margate on the other.

In Folkestone the price of gas is—to private consumers, 4s. 9d. per 1000; for public lighting, 4s. 6d. per 1000; the duty on coal, 2s. 3d. per ton. The public lighting is, on the average meter plan, one meter to every 12 lamps; and, with Sugg's burners, averaged to consume 4 feet per hour. The lamps are burnt all night, or an average of 10 hours each lamp per night. The total cost per lamp, including lighting, putting out, cleaning, &c., is £3 13s. 6d. per annum. The burners and regulators are the property of the company, who supply them and keep them in repair. The meters are the property of the corporation. It will thus be seen that the cost of lighting Folkestone is 5s. 8d. per lamp cheaper than Deal, although they burn two hours longer each night. Presuming they burnt the same at Deal, it would be 10s. 10½d. in favour of Folkestone.

At Margate the price of gas to private consumers is 4s. per 1000; the duty on coal is 3s. per ton, the price of coke is 13s. per chaldron, the number of lamps 220, Deal and Walmer numbering 227.

The public lighting is done by contract at £3 2s. 6d. per lamp. The lamps are lighted all the year round, except four nights at the full of the moon, the average number of hours of burning per night being eight. Each lamp is supplied with a regulator, the property of the company. The lighting, extinguishing, &c., is included in the contract. The cost of lighting Margate thus being 16s. 8d. per lamp lower than Deal.

Your committee observe that in some towns the plan is adopted of putting out the lights at twelve o'clock. On this method, beyond its economy, your committee offer no opinion.

With a view to further contract with the Deal and Walmer Gas Company, your committee had an interview with them, and subsequently placed before them three questions, the replies to which were as follows:—

Question 1.—The price per lamp annually, the company to light, put out, repair, &c., same as present contract.

Reply.—Per lamp, £3 16s. 10d.; for the additional 78 hours lighting in October ordered after contract made, 1s. 2d.; total per lamp, £3 18s. 7d.

Question 2.—The price per 1000 feet, on the average meter system, half the meters to be supplied by the council, the lighting, putting out, &c., as heretofore, and time of burning the same, or similar to present contract.

Reply.—The company decline to bear any part of the expenses of meters, and cannot therefore answer this question in the form in which it is put. The company, however, suggest that all the advantages which are expected to be derived from the adoption of the average meter system can be attained by the use of the regulators alone with fixed hours of burning. The expenditure upon meters would then be unnecessary.

Question 3.—Price per 1000 feet on the average meter system, half the meters to be supplied by the council, the lighting, putting out, cleaning, repairing, &c., to be done by the council, time of burning same or similar to present contract.

Reply.—As the company decline to bear any part of the expense of the meters, is unnecessary to be answered.

With regard to the reply to question No. 1, your committee cannot, in duty to you and the ratepayers, recommend its adoption, as the price there stated, the committee consider extravagantly high, being only 7d. less per lamp than their running contract, whilst the price of gas has been lowered 15 per cent.

In reference to questions Nos. 2 and 3, your committee are of opinion and regret to find the gas company evidently desirous of evading a direct reply. Under these circumstances they have no hesitation in recommending the adoption of the average meter plan in reference to regulators and fixed hours of burning. The committee estimate that the lamps are alight, on the average, eight hours per night, which, at 4 feet per hour, consumes 11,648 feet. Allowing 500 feet for each lamp per annum, during the nights of full moon, the quantity consumed would be 11,148 feet, which, at 5s., would amount to £2 15s. 9d., leaving a margin for extras of £1 2s. 10d. If at 4s. 9d. per 1000, as supplied at Walmer, the amount would be £1 5s. 8d. for each lamp. A still greater reduction would be effected by their not being lit at all on moonlight nights. The committee wish it to be distinctly understood they are perfectly unanimous in recommending the meter system, as its adoption in other towns has invariably been followed by the most satisfactory results.

Your committee have heard that, in consequence of some difference with their gas company, the Corporation of Poole, Dorset, have lighted their town with petroleum, with the following results. The town is lighted for twelve months at 10s. per lamp less cost than the gas company charged for eight months. The committee offer no opinion in this matter, but considered it necessary to bring the extraordinary fact before your notice.

ANALYSIS OF SPENT LIME FROM GAS PURIFIERS.—The material in question was obtained from a gas-work in London. Column 1 gives the author's (A. Guyard) analysis, and column 2 one executed by the late Professor Graham:—

	1.	2.
Hydrate of lime	15·10	17·72
Carbonate of lime	34·20	14·48
Sulphate of lime	0·25	2·80
Sulphite of lime	1·50	14·57
Sulphide of calcium	6·90	—
Oxysulphide of calcium	3·20	—
Hyposulphite of lime	11·80	12·30
Cyanide of calcium	0·25	—
Sulphide of iron	0·55	—
Free sulphur	4·30	5·14
Silica	1·80	0·71
Alumina	0·70	—
Magnesia	Traces	—
Coal tar and oil	0·25	—
Water	19·20	32·28
	100·00	100·00

From these results, it would follow that Graham's sample had been exposed to the air for some time, whilst that of the author was submitted to analysis immediately on its withdrawal from the purifier.—*Chemical News.*

RETORT SETTINGS, No. 2.

FIG. 1

FIG. 2

FIG. 3

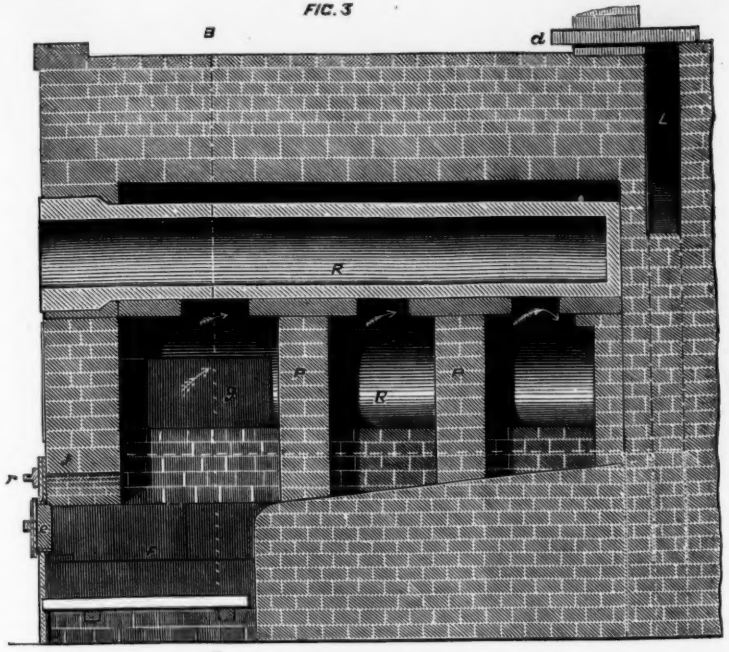


FIG. 5

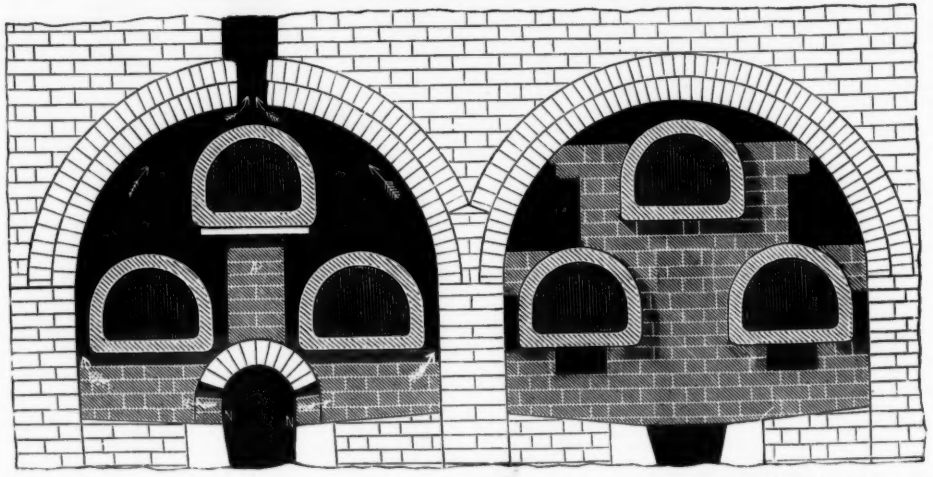
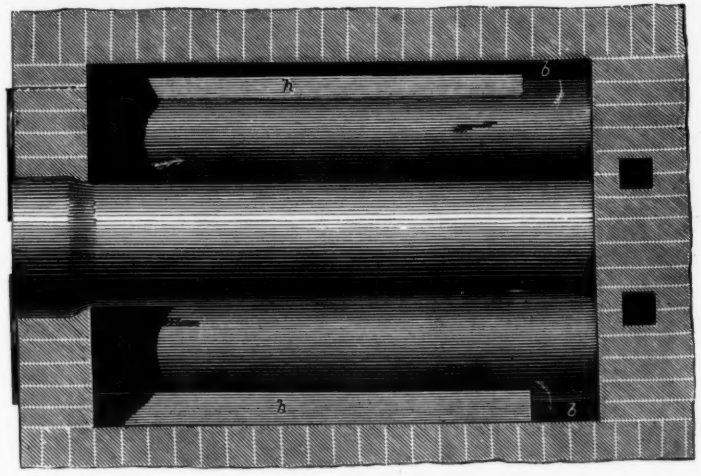


FIG 6

FIG. 4



SETTINGS OF THREE RETORTS.

MANCHESTER DISTRICT ASSOCIATION OF GAS ENGINEERS.

On Saturday, the 4th of March, the Sixth Annual and Twenty-Fifth Quarterly Meeting of the above Association was held at the Mitre Hotel, Manchester. Upwards of 30 members were present, and the chair was occupied by Mr. S. HUNTER, president. After the confirmation of minutes, the following gentlemen were elected members:—

Mr. John Blackburn	Hebden Bridge.
„ Thomas H. Daniel	Congleton.
„ J. G. Hawkins	Wigan.
„ W. Littlewood	Manchester.
„ S. R. Ogden	Blackburn.
„ G. E. Saville	Sowerby Bridge.

The SECRETARY (Mr. Braddock) then read the following report:—"The committee, in presenting their sixth annual report have much pleasure in being able to state that, during the past year, there has been a considerable accession of strength to the roll of the association, no less than 14 new members having been elected. In the same time two deaths have occurred, and four members have been excluded by reason of change of occupation. The net result, therefore, is a gain of eight members, increasing the total number to 63. The papers read during the year have fully maintained the reputation of the association, and although there is one element (the value of which cannot well be estimated)—that is, the opportunity meeting together affords for an interchange of ideas and mutual consultation, yet the committee cannot refrain from expressing their opinion that a more numerous supply of papers would be attended with advantage, both to the writers and the recipients. At the May meeting the association accepted the invitation of the president, Mr. Hunter, to pay a visit of inspection to the Rochdale Corporation Gas-Works. They subsequently accepted the mayor's invitation to inspect the magnificent town-hall, and were afterwards most hospitably entertained therein by the president. In financial matters there is little to remark upon beyond the facts that there is a good balance in hand, and that the arrears of members subscription are unusually large. The committee cannot overlook the latter fact, and they take this opportunity of calling the attention of those whom it may concern, and respectfully request prompt payments. In conclusion, the committee tender their thanks to the members for good attendances at quarterly meetings, and especially to those members who have contributed papers, for their invaluable efforts. The committee desire the members to unite with them in their endeavours, not only to maintain, but to increase the value of the association in the year upon which it is just entering."

The election of officers for the year 1876 was then proceeded with, with the following result:—

President—Mr. John Storer, Gas Engineer, Stafford.
Treasurer—Mr. James Paterson, Gas Engineer, Warrington.
Hon. Secretary—Mr. William Longworth, Gas Engineer, Dukinfield.
Two Members of Committee—Mr. John Chadwick, Gas Engineer, Oldham. Mr. James Braddock, Gas Engineer, Droylsden.
Auditors—Mr. William Smith, Gas Engineer, Hyde. Mr. David Clarke, Gas Engineer, Ashton-under-Lyne.

Resolutions to alter Regulations Nos. 2 and 15 were carried.

The new PRESIDENT (Mr. Storer) then took the chair, and said:

Gentlemen,—In delivering my address at this annual meeting of our large and important association, I feel no slight amount of timidity, arising partly from the unexpected honour of being elected your president, and partly from the doubt which I have of the eligibility to discharge my various duties of the office in a manner creditable to the association as a body, and to the satisfaction of each of you individually; but, however I may fail in satisfying you or myself, believe me to be sincere when I say that it will be my earnest wish and endeavour to uphold the honour of the presidency with my best ability. Having made these remarks, allow me to congratulate you on the unvarying success of the association, even from its commencement, a success not confined to its steady increase of members only, but, and I may say especially, also to the advantage of the information derived from the many valuable and interesting papers which have been read and discussed at our ordinary meetings. As you are aware, our association has existed six years, and our present number of members is 63; the increase of members during the last twelve months has been eight. I must remind you that, but for our very stringent rule which excludes other than engineers or managers of gas-works in operation from being members of our association, many more would have joined us. I feel sure you will agree with me, that the present number of members is an evidence of the prosperity of our association, which has fairly met the want the British Association of Gas Managers seemed unable to cope with.

I am sensible, gentlemen, that the remarks which I am about to make must necessarily be subject to your criticism, and when I consider the admirable manner in which my predecessors in office have fulfilled their duties, I must hope for a large share of your considerate indulgence for my many faults, both of omission and commission, which may occur in my address, or in my manner of delivering it, having neither practice in literary composition, nor skill in addressing a body of experienced gentlemen, such as I see before me.

To my mind, there can scarcely be any profession which has greater need of association than our own. Unity is said to be strength, but that great good can be effected by a division of labour is, I think, easily made apparent. No man, however able, can expect to excel in all the various branches of knowledge required by a gas engineer. He should be an able accountant, an architect, a civil engineer, a mechanic, and an organizer of labour. We frequently find that a gas engineer has a *forte* for one particular branch of his profession, and that he directs his energy and ability to perfect that one branch, relying on the certainty that some other fellow-labourer is devoting his attention to another subject of equal importance; and thus each will be able to inform the other of his respective improvement.

You have only to cast your eyes on the members assembled here to feel the force of this remark.

The object of our society is to diffuse amongst our members the knowledge derived from special studies, and I would urge on you the importance of still greater efforts, by advising members to choose the particular branch of science for which they are best fitted, and to read short papers thereon at our meetings; thus the benefit to members, to science, and to the public ultimately, would be great indeed. It is a fact upon which we may congratulate ourselves that we are now met in the city which gave birth to the British Association of Gas Managers, and which is also the home of our flourishing association. Our example, I am proud to say, has been imitated in the southern district of the country.

There is no doubt that the transactions of the British Association of Gas Managers, the publicity given to them by the JOURNAL OF GAS LIGHTING, and the vast importance of gas lighting (so fully recognized during the last few years) have called forth scientific aid in the manufacture and distribution of gas. Active and intelligent minds are at work, making improvements which will lessen the cost of gas—indeed, I may say that another leaf has been turned over in our history. Stoking by machinery is being perfected, which will obviate expensive labour. Condensing, scrubbing, and exhausting processes are now receiving particular attention, and are likely to prove very superior to the processes of the past. Purifying is also being considered by eminent chemists, and is reduced almost to a science; and economy in burners is being noticed. I will now briefly allude to a few of the processes just mentioned, and I hope that the members of our association will give them their attention during the ensuing season. After many inventions had been patented at great cost and thought, Mr. Foulis appears to have hit on the use of hydraulic power as a medium for mechanical stoking. In this city, at the Rochdale Road works, four Foulis machines are at work. The system appears a success, but its great cost will exclude it from small works. To supply such, however, with machinery, Mr. West has invented a simple and inexpensive apparatus, which has been for some time in use at the Maidstone Gas-Works, and which effects a saving in wages, economy in coke, and an increased production of gas. The apparatus is light in construction, and is easily worked by manual labour.

The Körting-Cleland exhauster promises to revolutionize the present systems of condensing, scrubbing, and exhausting. It may be seen in successful operation at the Linacre works of the Liverpool Gas Company. It is one of the greatest improvements in gas manufacture of late years, and I will briefly describe its combined process. The gas, instead of passing up and down a series of pipes, is made to go slowly down all the pipes of the condenser, being at once drawn forward by the steam-jet. The scrubber is a *fac simile* of the condenser, having a quantity of rough shavings in the pipes. The work is done quietly and economically, causing but little wear and tear of machinery, no oil is wanted, and very little attention is required. This machine is such a success at the Linacre works, that its more general use will supersede the present system.

As to purification of gas, the action of lime is becoming better known, and though for a time it was displaced for iron oxide, it appears to be regaining its original place as the proper material for purifying.

A more accurate measurement of gas, by the operation of the "Sales of Gas Act," has not, perhaps, been attained, unless Warner and Cowan's meter has effected anything.

I wish some scientific individual could, and would, invent a meter free from the faults of the present dry and wet ones. Such an invention would be hailed with even more pleasure by consumers than by the profession.

The attention which our friend Mr. Sugg has given to the construction of burners is reaping its reward. The waste of gas caused by using ordinary common burners is enormous. In Dundee alone Mr. M'Crae considers the annual waste of gas to be a loss of £15,000 to the public. Any one who has compared the old Argand with Sugg's improved "London" burner, must have seen the superiority of the latter.

With respect to photometry, the wonderful discovery of the radiometer, by Professor Crookes, promises to simplify one of the most difficult problems of the profession—the accurate and quick measure of the illuminating power of gas. Another proof that the most scientific men of the age are giving us the benefit of their genius.

In conclusion, let me press upon you the importance of carrying out the improvements suggested by scientific men. Let our efforts be such, that this district may be still in the van of our profession, and let us use our best efforts to increase the mutual benefits of our association.

There are many other important matters of which I might have spoken, besides those which I have considered; but, as I have exhausted my time, and, perhaps, your patience, I will conclude by offering you my twofold thanks. First, I thank you for the honour you have conferred upon me in electing me your president; and next, for the kind and attentive manner in which you have listened to my remarks.

Votes of thanks were awarded to the ex-president, ex-secretary, auditors, and committee, and were suitably acknowledged. After the business was transacted the members sat down together to tea, and a very pleasant evening was spent.

AMERICAN GASLIGHT ASSOCIATION.

[Condensed from the Report in the *American Gaslight Journal*.]

(*Concluded from page 355.*)

WEDNESDAY, OCT. 21, 1875.

ROWLAND'S RETORT CHARGING MACHINERY.

Mr. T. F. ROWLAND (of the Continental Works, Greenpoint, Brooklyn), being called upon by the president to explain his apparatus for charging and drawing retorts, said: I can say but little upon the subject of stoking that will be of interest of you. Numerous machines have been produced in Europe and in this country, but none of them have proved successful except two, and those are the inventions of Mr. Foulis, of Glasgow, and Mr. William Mann, of London. At the present time, my machine promises very good results. Whether it can be adopted in gas-works in this country is questionable. I have given the subject some study and some little time. I have produced models of two or three different apparatus, all tending to reduce the labour of charging in gas-works; but the mere matter of putting coal in a retort is of very small consequence one way or another, compared with other matters of so much more importance connected with the manufacture of gas. The coal must be brought into the retort-house in such a manner as to be put in the machine without labour. None of the machines that I am familiar with contemplates this part of the operation. The coal must be brought in in the ordinary way in a horse-cart, and dumped on the floor, and then shovelled into the machine, requiring a great deal of labour. I exhibited my models in London for 30 or 40 days, and had nearly all the gas engineers of Great Britain to see them. But that does not amount to anything. A model will sometimes work when large machines will not. My idea was to draw three retorts at a time, and that pleased the English people very much. It has been proved, however, by actual experiment, that only one retort can be charged at a time or drawn at a time. So, on my return home, I turned my attention in that direction, and my arrangements are such now that coal can be taken from the coal-house and deposited in the machine, or put into the scoop in charges that will not vary one per cent. either way. A thousand charges may be run through, and they may be weighed upon scales, which I have done, and they will not vary one cent. either way. I can put the coal in the retorts and draw it out again, and can do it at a cost which, in works of the size of those in New York, would save, in the item of stoking, 150,000 dols. I am not prepared to back my statement up by actual proof, save in the one particular of drawing red-hot coke; but I think I can demonstrate that what I say is true, to any gentleman who will step across the river and see my machine work. It will probably be set up in the works of the New York City Gas Company this winter. I will close my remarks by requesting any gentleman to call at my office. I do not ask you as a society, for I do not want my machine to be advertised any more. It has been advertised enough already; it is a matter of very little interest to but very few in this country, as I am pretty well satisfied that no works which produce less than 1,200,000 feet a day can afford to have any mechanical arrangement of this kind in their establishment.

Mr. NEAL: Why?

Mr. ROWLAND: Because the cost of the machine is so great, and also the cost of running it. In answer to further questions, Mr. Rowland said in the New York works there were 600 retorts, and it took three machines to run them. It required one machine to every 200 retorts. The cost of each machine including the royalty, was about 5000 dols. As to the saving to be effected by the use of the apparatus, he remarked that there were a good many things to be considered in making an estimate—such as the position of the coal-store, and the means of getting the coal from the store into the retort-house. To charge any retorts, however large they were, would take five minutes. He had no means at his command for estimating the difference in the saving of loss of

gas by charging in this way over the ordinary scoop method. He had seen two benches of six retorts charged in twelve minutes by hand.

Mr. OLNEY, whose question had elicited the two last replies, said the loss of gas in charging retorts was a subject he had thought much about. Under the old-fashioned method the loss was enormous. He had made an estimate for the old Brooklyn Gas Company, and he made it very low, but it was nearly equal to a dividend for the company.

REMOVAL OF NAHPTHALINE.

Mr. NEAL: In the works that I have under my charge I have been troubled very much lately with naphthaline in the mains and service-pipes. It comes and goes. Some days we are greatly troubled with it, and then it seems to disappear; and I have thought that, in the case of naphthaline, like produces unlike effects. The subject was discussed at a meeting of the New England Association, but not very thoroughly. The topic was "Naphthaline—its Cause and Remedy." I do not think either the cause or the remedy was discovered. I am sometimes troubled very much by its forming both in the inlet and in the outlet, so that in the evening at the valve-house, when the gas is being lighted, it will gradually begin to close, and after turning on all that can be turned on, there would yet be a short supply in the city. The trouble extends into the service-pipes. Two or three mains have been stopped; and I was obliged to take up a 2-inch main running a short distance from the main-service, and which supplied the State Prison—a large and flourishing boarding-house. Each convict is allowed a light in his cell, quite small, but yet they appreciate their lights very much, and when any of them have not behaved properly, their light is taken away from them, and that is about as severe a punishment as can be administered. A great many of them spend their evenings reading and writing and making toys, and thus the light allowed them is a great privilege. But that has nothing to do with the question. As I said, it was necessary to remove the 2-inch pipe and put in a 3-inch pipe, and it was found to be full of naphthaline, and some portions of the pipe had been eaten away. I can give no reason for this. The same trouble occurred with the pipes that supplied a railroad company. We had to take out a 2-inch pipe and put in a 3-inch pipe. The street lamps are also choked up with naphthaline very often. I have no cause to assign for the trouble, and no remedy to suggest. I have brought forward this topic in order to get some information upon it, and at the request of a number of friends.

Mr. WHITE: Was the pipe all foul, or only in places?

Mr. NEAL: In places.

Mr. WHITE: Did you notice the depth of earth?

Mr. NEAL: The depth of earth makes no difference. I suppose they were 2 or 3 feet below the surface. It is only in the summer or in the fall that it gives us trouble. It passes off entirely in cold weather.

Mr. HERZOG: I was formerly greatly troubled with naphthaline, but I think I have pretty nearly, if not entirely, overcome the evil, and by a simple remedy. The means I have employed is to mix with the lime a sufficient quantity of benzine, which not only tends to liquefy the naphthaline, but also to relieve the pressure. I find I never have more pressure than the actual holder pressure. My object is to bring the gas into thorough contact with some of the lighter hydrocarbons. I say it must be brought into thorough contact. Different methods have been employed. For instance, it has been poured into the gasholders in syphons, and then it has been sprinkled. But none of these remedies are anything more than partial ones. I made many experiments. I tried putting some benzine on the condensers and scrubbers; that helped partially, but it was of no great avail. Then I tried sprinkling the purifiers, and that partly diminished the trouble. I thought if I employed more, I should have better results, and I did so. I find, in my experience, that mixing one gallon of benzine with five bushels of lime, does away with the naphthaline pretty entirely. It is only a question to employ enough. At certain times you are not troubled at all, and perhaps you do not need any; but if you find that there are signs of a great deal of naphtha, you will have to employ more benzine. That is my remedy, and I will guarantee that if any gentleman will try it, he will find it to be as effectual as I have done. To those using iron purifiers I would recommend having a box filled with sawdust, and saturated with hydrocarbon. If you pass the gas through that, it will remove all the naphthaline, and it remains in a more liquid state in the purifiers. If you try to obtain from coal too large a yield, the naphthaline—all the circumstances being favourable—will become solid, and when it does not destroy the gas it impoverishes the quality. Some gentlemen here have their boxes running for a month or so. These hydrocarbons should be taken out before that time. I found, for instance, when my boxes ran too long, I had to take the covers off and give them a fresh sprinkling, and that helped entirely.

Mr. NEAL: I tried sprinkling the layers, and the pressure went to six inches and rose rapidly, but in a little while it was all done; it seemed to have only a temporary effect. I do not exactly understand the last speaker's method, whether it is by sprinkling or not.

Mr. HERZOG: I said that sprinkling did not answer very well. You want to mix the water with the lime, and the benzine with the lime, and bring the gas in thorough contact with it. It gives a partial relief if you sprinkle; but if you bring it into thorough contact you will have a more thorough effect. I mix it with the lime before it is put in the box.

Mr. FLOYD: At the New Haven works they were troubled with naphthaline for a good many years, so much so, that the pipes, in a great measure were stopped up, and the complaints from consumers that they could not get gas amounted to 150 every week. They tried a dry condenser, somewhat upon the principle spoken of by Professor Chandler last evening, and in 36 days after it was put in, to the present time, all complaints about naphthaline have ceased. I have spoken in general about this matter. Mr. Sherman, the engineer of the company, is here, and can give the facts in detail. I was informed that they found the dry scrubber a complete remedy for the naphthaline.

Mr. SHERMAN: This friction scrubber was started on the 20th of October of last year, and the complaint-book shows an immediate falling off in complaints from this cause. At the present time we have very little complaint from naphthaline; occasionally we have stopped service-pipes. The pipes which I have opened at the works I have found from one-third to one-half closed with naphthaline. Mr. Cox, my predecessor, says the effect of the friction scrubber is to leave the naphthaline around the works.

Mr. HERZOG: I some time ago made some observations, and found that after the hydraulic main had been in action for a few years, the pressure became somewhat heavy. On examination I found quite a deposit of naphthaline, which is conclusive proof that the liquid is capable of taking up a part, at least, of this naphthaline. I will repeat what I said before, that for those using iron purification, I do not think it would be advisable to mix the lime and the benzine with the iron, but to have another box and seal it, and let the gas pass through that.

Mr. OLNEY: I have had occasion to know the experience of five works where they manufacture gas from petroleum oil in connexion with coal, and that in two works where there had been many complaints coming in daily, after they began the manufacture of gas from petroleum, those complaints were never heard. They were not troubled with naphthaline in any respect, and there was not a particle of it to be discovered. In any works where petroleum has been used, either alone or mixed with air or coal, I defy any one to find one particle of naphthaline.

Mr. FLOYD: I have seen the official record in New Haven, and it shows that in thirty days from the time the dry scrubber was put in operation, there were no complaints whatever in regard to naphthaline. If this is a fact, I think all coal companies should know it.

Mr. WHITE: Mr. Cox, the engineer of these works, assured me personally that the scrubber did not work.

Mr. PRICE: I should like to inquire of Mr. Herzog what kind of oil he used.

Mr. HERZOG: I used benzine at 75 Beaume. If you employ gasoline that will be far safer. If you use benzole it would not require so much.

Mr. PRICE: Suppose the works used iron purification, how would you use your method?

Mr. HERZOG: I should construct a separate box for that purpose, fill it with sawdust, and saturate it with one of these hydrocarbons, and pass the gas through it. I put five bushels in a box, and a gallon of benzine, the specific gravity of which is from 70 to 65 Beaume.

Mr. GERDENIER: About five years ago, in the works which I have the pleasure to superintend, naphthaline had become a very serious annoyance to us, and I tried the method Mr. Herzog has spoken of. In the first place I used petroleum, and found that it took up a great deal of naphthaline. A short time afterwards I saw in Appleton's "Encyclopædia" that naphthaline could be taken up with volatile oils, and I thought I would try crude naphtha. I got three barrels, and mixed it with sawdust, and mixed it with my lime, and the effect was that I was totally relieved of the trouble. In the 150 bushels of lime and sawdust together I used eight gallons of crude naphtha. I have had very little difficulty since. I have not had any in my purifiers, and have had no difficulty in the inlet or in the holder. Our works are small, of course; but that was my experience.

Mr. EDGERTON brought forward and exhibited an instrument for the correct analysis of gas, also an improved photometer, for which he received the thanks of the association.

On the motion of Mr. NEAL, it was resolved that there should be no semi-annual meeting in 1876. After some discussion, it was referred to a committee of the whole members to investigate and report to the next annual meeting upon the petroleum gas question, and it was left to the Executive Committee to make arrangements for that meeting, and to select members to prepare papers to be read on the occasion.

Mr. BALMORE, in answer to a question by the PRESIDENT, said the dry scrubber of St. John and Rockwell had been in use at the Harlem Gas-Works for two years, and they were very well satisfied with its operation. Formerly they were troubled with naphthaline, but now were entirely free from it. They had not used anything but coal in the manufacture of gas since it had been employed.

This being the whole of the business of the Association, attention was called to the admirable manner in which the proceedings had been reported in the *American Gaslight Journal*, and it was proposed to elect Captain G. Warren Dresser, editor of the journal, to be an honorary member of the Association.

Mr. CARTWEIGHT said the Executive Committee had informally contemplated the nomination of Professor Chandler and Captain Dresser as honorary members.

Upon the ballot being taken, these gentlemen were unanimously elected.

Captain DRESSER, being introduced to the meeting, gracefully acknowledged the compliment thus paid him.

The Association then adjourned *sine die*.

NEWCASTLE-UPON-TYNE GAS SUPPLY.

At the Meeting of the Newcastle Town Council, on Wednesday, the 1st inst. —Mr. JOHN PATTINSON, the borough analyst, presented the following report, addressed to W. H. Stephenson, Esq., Mayor of Newcastle-upon-Tyne, Chairman of the Gas Committee of the Newcastle Town Council:—

Dear Sir,—I have the honour of presenting the following report, which gives in a tabulated form the results of my various testings of the gas supplied to this borough by the Newcastle-upon-Tyne and Gateshead Gas Company, during the year 1875.

The gas has been tested twice in each week, at the office of the gas company in Neville Street, for its illuminating power, the amount of sulphur it contains, and to ascertain if it contains any sulphuretted hydrogen. I have supplied you each week with the results of these testings. The following table shows the maximum, minimum, and average illuminating power of the gas during each month of the year. The standard burner used in these testings has been the same as that in use when the Newcastle and Gateshead Gas Act was passed, described therein as an Argand 15-hole burner, with a 7-inch chimney (the Sugg-Letheby burner).

Illuminating Power in Standard Sperm Candles.

	Max.	Min.	Average.
January	15·5	14·3	15·01
February	15·7	14·6	15·06
March	15·4	14·8	15·00
April	15·2	14·0	14·80
May	15·0	14·1	14·30
June	15·6	14·1	14·84
July	16·3	14·4	15·40
August	15·7	13·8	14·37
September	15·8	14·7	15·27
October	15·7	14·3	15·08
November	15·8	14·6	15·12
December	15·8	14·0	14·95

The illuminating power has been on only one occasion during the year below the required parliamentary standard of 14 candles. The average illuminating power during the year is 14·93 candles.

The following table shows the maximum, minimum, and average amounts of sulphur contained in 100 cubic feet of gas during each month of the year:—

Grains of Sulphur in 100 Cubic Feet of Gas.

	Max.	Min.	Average.
January	17·02	6·91	10·51
February	21·74	12·30	17·59
March	22·33	7·04	13·76
April	8·20	6·04	6·78
May	6·68	5·34	5·95
June	20·51	7·14	12·23
July	12·91	6·50	9·01
August	21·96	5·95	10·62
September	19·07	5·85	11·20
October	16·54	6·32	12·75
November	17·33	7·93	13·58
December	12·32	6·34	8·06

On 16 occasions during the year, the amount of sulphur has been beyond the amount allowed by the Act of Parliament, which is 17 grains. The excessive amounts of sulphur were owing to irregularities in the working of the purifying apparatus; but the exact nature of these irregularities was not discovered by the gas company. The average amount of sulphur during the whole year, as indicated by the tests, was 11 grains per 100 cubic feet of gas.

The gas has always been free from sulphuretted hydrogen during the year.

Knowing that complaints are occasionally made of the bad quality of the gas supplied to Newcastle, and that these complaints, in most cases, arise from the gas being burnt through burners totally unfit to develop the light it is capable of producing, I have had a number of burners tested, which have recently

been taken off gas-fittings in Newcastle, and compared the light they produce with that produced by other good burners. The results I have obtained show that the first-named burners give lights equal to 3¾, 5¼, 5¾, 6, and 7 standard sperm candles respectively, when burning gas at the rate of 5 cubic feet per hour, whilst the same quality of gas, burnt at the same rate through the standard burner by which the gas is tested in Newcastle (the Sugg-Letheby Argand), gives a light equal to 14·1 standard candles, and when burnt through Sugg's improved "London" Argand or Silber's Argand, gives a light equal to about 17¾ standard candles. The same quality of gas, when burnt through good flat-flame burners, which can be had, I believe, from all the gas-fitters in Newcastle, gave a light equal to 11 and 12 candles. I am still making experiments as to the best flat-flame burners which can be obtained, and shall make the results of my tests known to the public, so that gas consumers in Newcastle may be enabled to obtain such burners as will best develop the light-producing qualities of the gas. At present, as the above results show, gas-burners are in use in Newcastle, and in extensive use, which develop only from one-fifth to one-third the amount of light which a good burner would develop from the same quality and quantity of gas. The disadvantage of using such bad burners does not end with the increased cost of gas for producing a certain amount of light; for, besides this, there is also the great disadvantage of sending into the air of the room from three to five times more than is necessary of sulphur compounds and other products of combustion of the gas, which tend to make the air oppressive and unhealthy to breathe.

(Signed) JOHN PATTINSON.

Laboratory, 75, The Side, Newcastle-upon-Tyne, Feb. 10, 1876.

MANUFACTURE AND PURIFICATION OF SULPHATE OF AMMONIUM FROM GAS LIQUORS.

By Dr. J. ENEU LOUGHLIN.

There are two liquors from which the manufacturer derives the ammonia used in making sulphate. The first liquid flows from the condensers (air), is known as drips, is of sp. gr. 10·20—28, pale yellow colour, and yields a large amount of sulphate. This liquid is at present run into the mass of the second liquid, which is known as wash water or scrubber liquor. This is obtained as follows:—The gas, washed with a current of water, is freed from a certain amount of carbonate of ammonium and sulphide of ammonium, which pass into the water and form weak ammonical liquors, which are pumped into large tanks, and used to wash the fresh gas two or three times. They are then considered sufficiently strong to pass into the manufacturer's tanks, and must then be settled perfectly. This wash water is mixed with a certain amount of light tar, which settles; the clear yellow liquid above this tar is the wash water, is of sp. gr. 1·014—1·026, has a faintly aromatic odour, mixed with odour of gas and sulphuretted hydrogen, and holds in solution carbonate, sulphide, sulphocyanide, and sulphate of ammonium, and compound ammonium bases, naphthaline, light oils, and a small amount of bisulphide of carbon.

Analyses of wash water give 2 to 6½ ozs. per gallon available sulphate—that is, one gallon contains sufficient ammonium oxide to form, when neutralized with ordinary commercial sulphuric acid, 2 to 6½ ozs. of grey sulphate of ammonium. Hydrochloric acid is sometimes used to neutralize the wash water, but it does not offer any special advantages. To analyze a sample of wash water, one gallon is taken and filtered through some coarse wool (which has been previously well washed and deprived of grease), the resulting clear yellow liquid is divided into two parts, which are separately carefully neutralized with dilute sulphuric acid, evaporated to dryness, redissolved in distilled water, and carefully evaporated to dryness; the theoretical weight of commercial sulphate in each gallon of wash water multiplied by 0·9 gives the practical results obtainable in working on a large scale. The results vary considerably, according to the kind of coal used in making gas, the degree of heat to which it is subjected, and more particularly as the gas is more or less thoroughly washed to deprive it of its ammonium salts.

Specimens of hydraulic main water gave 2 to 5 ozs. per gallon. The amount of carbonate of ammonium ranged from 202·7 to 2000 grains. Some specimens were rich in sulphide and poor in carbonate, and some contained quite considerable amounts of sulphocyanide.

Analyses of drips or condenser liquor show the richness of this product as compared with hydraulic main water and wash water—

1 gallon yielded	13½	ozs. sulphates.
1 „ „	16⅔	„
1 „ „	18	„

The amount of condenser liquor is small. The hydraulic main water is obtained much diluted with water; obtained direct, it gives from 8 to 13 ozs. of good sulphate.

These researches refer to experiments made with waters obtainable from the Philadelphia Gas-Works. The liquor, after properly settling, is run into large iron retorts or boilers, mixed with 1½ parts slaked lime for every one part of sulphate of ammonia (obtained in the preliminary analysis of the gas water); "excess of lime is found more beneficial than would appear at first sight; the last portion of ammonia appears to be liberated more regularly, not so much sulphuretted hydrogen is evolved, and tarry matters are retained, partly chemically and partly mechanically." Steam is then blown into the mixture (40 to 60 lbs.), the gas is copiously evolved, and passes into a lead-lined cistern half filled with strong sulphuric acid, the acid becomes diluted by the condensation of the steam, but before it is too much diluted the sulphuric acid is sufficiently hot to allow the steam and gases to pass through uncondensed. To facilitate the exit of gases, &c., the lead-lined cistern is provided with a lid, half of which is hinged, so as to allow replenishing the acid, noting the reaction, and taking out the contents; the other half is perforated with one or two openings, through which pass pipes to convey off the gases, steam, &c. The gas (ammonia) is evolved very rapidly during the earlier stages of the reaction, the sulphuric acid loses its strong acidity gradually, and, when it is nearly neutral, the salt begins to deposit in the cistern; this is removed by a perforated copper ladle, thrown into a second lead-lined cistern called a cooler, and when it is partly cooled, is thrown upon the drainer, which is made of common pine lumber, about 3 feet by 6 feet, with the back and two sides made up of like lumber to a height of 12 to 18 inches; the whole is lined with lead; the salt drains into the cooler, and, when almost dry, is put into baskets, and allowed to drain perfectly, its colour varies from a dark grey to a perfect snow white, the crystals are generally quite small, and the reaction is almost always acid. The per centage of ammonia varies from 18 to 24; that of water from 2 to 4½.

The impurities in commercial sulphate of ammonium are sulphate of lead, from the sulphuric acid acting upon the lead cisterns, and normally present in commercial sulphuric acid, naphthaline, sulphobenzole, tarry matters mechanically carried over, sulphate of calcium, and sulphates of the compound ammonias. The question is, how to rid the commercial sulphate of its impurities. The best process is to dissolve it in large vessels, allow it to settle perfectly, and draw the clear liquid into evaporators. This will rid it of many of its impurites, and furnish a white product; but this white product, if used to make aqua-ammonia, will furnish a product containing naphthaline. If ordinary sulphate of ammonia is used to make aqua-ammonia, we often notice the colour (after standing a week or two) varies from a yellow to a light green; this is due to the tarry matters carried over; sometimes it turns blood red, owing to the rosolic acid which is slowly developed from tarry matters exposed to the action of ammonia. It would be more economical for manufacturers to settle well the gas water before use in making the sulphate of ammonium. Professor Emile Kopp has recommended that copperas to remove the sulphur compound be added to gas water previous to distillation. But thorough settling and use of excess of lime acts very beneficially.

To make an absolutely pure sulphate of ammonium, heat the commercial salt with three-fourths of its weight of strong sulphuric acid till decomposition commences, add a small quantity of nitric acid, and heat the liquid until it is decolorized. The hydrate of ammonium evolved from this pure salt by heating with hydrate of calcium has merely a pungent odour, quite different from that of common hydrate of ammonium.—*American Chemist.*

ON EVAPORATION AND ON PERCOLATION.

By Mr. C. GREAVES, M. Inst. C.E.

A paper on the above subject was read by Mr. CHARLES GREAVES M. Inst. C. E., at the meeting of the Institution of Civil Engineers, on Tuesday the 29th of February.

This paper treated only of evaporation due to natural influences, from observations at Lea Bridge. It contained a proposal to gauge, by an apparatus as simple as an ordinary rain-gauge, the loss of water from the re-evaporation of rain—the usual method of learning the hygrometric state of the air being by the dry and wet bulb thermometers. The gauges included a percolation gauge, which was larger, but did not differ greatly from the Dalton gauge, started by the late Mr. Dickenson, at Abbots Langley, to which the author had added one filled with fine sand, to ascertain maximum percolation. Lastly, evaporation from a surface of water was determined by floating the gauge in a vessel, or in some river, open tank, or reservoir, and it was assumed that the water in the inner vessel acquired the general conditions of that in the outer vessel. The rain gauge and percolation gauges were not new, but the form employed for determining the amount of evaporation from a surface of water had not been proposed elsewhere; moreover, the four series of observations had never been brought forward in juxtaposition, and with apparatus of uniform construction.

Tables were submitted of the rainfall, from observations uninterruptedly maintained, since 1855; of the percolation, which by subtraction showed the evaporation from the ground, since 1855; of the percolation through sand, which furnished also the evaporation from sand, since 1860; and of the evaporation from a surface of water. The author gave the average rainfall as 25 inches, the average percolation through sand as 20 inches, and the evaporation from a surface of sand as 5 inches; percolation through earth as 7 inches; evaporation from a surface of earth as 18 inches; evaporation from a surface of open water, 20½ inches; and the gain of water in an open tank 4½ inches only. These tables showed that all the water that could be relied upon as retained for use was a depth of 7 inches, if the rain fell on a permeable soil, and of 4½ inches if it fell on an open tank or reservoir. To secure more than this, covered reservoirs or close vessels, to prevent evaporation, would be necessary. The principal deduction from the facts observed had been the smallness of the remainder of the rain-water left after the influence of evaporation had been felt; and this was noticeable whether the water had been at once stored in reservoirs, or had been allowed to sink into the porous earth and was stored there. In either case the proportion unevaporated was small, the average annual result from 14 years observations showing 5·108 inches of water, as added to an open water surface, and 7·582 inches as absorbed by the ground; the results of 19 years and 22 years indicating still less, as had been mentioned. Certain geographical limits must be given to these data, which, excluding Wales, Devon, and Cornwall, would probably be applicable over all the south of England, and as far north as the Trent and Severn. The Northern counties, Scotland, and Ireland would have different ratios of evaporation, and doubtless the springs were better fed.

The phenomena of peculiarly dry years—years in which the rivers and springs had been deficient—viz., 1861, 1864, 1868—were discussed. Springs and rivers had been redundant in 1852-53, in 1857-58, in 1860, in 1866, and in 1872. It was manifest that, with a view to provide for the permanent and continuous needs of large communities, the probable fluctuation of delivery of water in a river might be gathered by watching closely the sequence indicated by the percolation gauge. Heavy rains and storms in summer might produce a river flood, yet fail to replenish the springs; and a long frost, even with considerable snow, might leave rivers and springs very short of water for the following autumn; and a dry winter imperilled the permanence of river discharge more than a hot summer. The latter, however, might succeed a dry winter, under which circumstances the deficiency of water in the rivers must become alarming, in view of the present tendency to the aggregation of populations. One result of the comparisons deduced from the tables attached to the paper was, that the storeage of water might be more safely and largely secured in a porous subsoil, covered with a turfed surface, than in ponds, reservoirs, or other accumulations of open water. The author added, that frequent thaws of small falls of snow produced the greatest amount of percolation; that hollow draining did not diminish the perennial flow of rivers; that capillarity had only a negative influence; and that the influence of a wet period on percolation rarely extended over more than one season, and was soon obliterated by a dry winter succeeding.

The flow of springs and of rivers followed the increase and decrease of percolation more closely than the rainfall, except in the temporary effects which immediately succeeded on copious rains. Negative evaporation, or an increment of water without rain, occasionally, though seldom, occurred in the floating gauge; but it was of frequent occurrence in the sand gauge, from the low temperature acquired by the sand by radiation, when the gauge became a dew-tank.

BARBADOES GAS-WORKS.—The *West Indian* of Jan. 28 says: "On the evening of Friday, the 14th of January, the town (Bridgetown, Barbadoes) was lighted with gas for the first time, the works having been erected by Messrs. W. Blews and Sons, Birmingham. At seven o'clock, the governor, with Mrs. Hennessy, and the colonial secretary, drove down Broad Street, followed by a long train of carriages, and an immense concourse of people on foot, in front of the public buildings, where was the most conspicuous illumination of a crown, with the royal initials, and 'God save the Queen' written and encircled with a wreath of gaslight. Messrs. Bowen, Lawlors, and Elwell's warehouses, the Bridgetown Club, and the ice house, were also illuminated. There was a star in Swan Street, another in High Street, and two in the Roebuck; one at the west gate of Queen's House, and another at Belmont, and at Enmore Corner, with an illuminated arch. Standing on the bridge, one saw a dense crowd, through which there was no passing, filling Trafalgar Square, with the statue of Nelson looking down upon them, and behind, the galleries of the public buildings thronged with well-dressed ladies and gentlemen, all seen in the gaslight, for there was no moon. Even the fountain looked beautiful, as it played over the heads of the mass of dark faces. The scene was animated and impressive. There never was a greater crowd gathered in Bridgetown, consisting of several thousand persons, of all classes; and never did a crowd conduct itself with more decency and propriety. They followed the governor without any boisterous demonstrations of their feelings—without more noise and struggling than belongs to a crowd—as if they were performing a part in the programme for the inauguration of the gaslight. Not a rude gesture, not an angry word, not a drunken man was seen, not an accident occurred to mar the celebration. There are roughs in Bridgetown, as well as elsewhere; but, on this occasion, we can only say of them, they had the good sense to keep themselves on their best behaviour, from seven till ten o'clock, when the gas was shut off, and the crowds dispersed."

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There have been several transactions in pig iron during the week, the numbers chiefly in request having been higher qualities of foundry descriptions. The agents of North Yorkshire producers now quote about the following rates:—No. 1 foundry, 52s.; No. 2 foundry, 51s.; No. 3 foundry, 49s.; No. 4 foundry, 48s.; No. 4 forge, grey, 48s.; No. 5 forge, mottled, 48s.; No. 6 forge, white, 47s. 6d.; refined metal, 69s.; Kentledge, 57s.; and cinder pig, 39s.; all per ton. A good kind of Derbyshire foundry pig is quoted at 62s. to 65s., but there is not a great quantity on offer. John Brown and Co., and Brown Bayley and Dixon, both "Limiteds," have engaged in the manufacture of Spiegeleisen, the latter concern having hired one of the blast furnaces of the Charlton Iron Company. The leading foundries at Sheffield, as well as at the neighbouring parts of Derbyshire and Yorkshire, are not by any means busy. Some few of them are executing orders for miscellaneous castings for engineering purposes, and at a few others there are good specifications in hand for gas, water, and steam pipes.

The Rotherham and Sheffield brassfounders are hardly so busy as at the corresponding period of last year. There are still, however, a number of fairly large orders coming in for gas-fittings, water-closet fittings, bib and stop cocks, gun-metal taps, hot and cold water bath-cocks, and other plumbers requisites. Prices of these goods are pretty well maintained, the first-class houses, of course, being able to secure better quotations than the smaller makers.

There is a good deal of speculation in the local coal trade as to the course which may be taken by the South Yorkshire and North Derbyshire colliers, who have just received notices of a reduction of 15 per cent. in wages, to take effect on April 14. There is a rumour that the men will in all probability resist the proposed reduction, and, if the masters are firm, may come out on strike; at many of the collieries, however, only three days weekly are being worked, as the output is very much in excess of the demand. There is, I am inclined to believe, little probability of any increase of prices resulting from the arrangement of the wages question.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The slight improvement noted last week in the demand for finished iron was confined, for the most part, to the distribution of a few good specifications for sheets and plates, chiefly on account of the Indian and Australian markets, and the general condition of the trade must still be pronounced dull and very unsatisfactory. The leading firms are, on the whole, better employed than the makers of the commoner descriptions of iron, but in no department of trade is the demand at all strong or healthy. The opinion that rates must shortly be revised is now rapidly gaining ground, and a substantial reduction in prices is confidently expected at the forthcoming quarterly meeting.

There is not much change to note in current quotations, prices having already been reduced to the lowest remunerative level, while the present rates of fuel and labour are ruling, though, in all departments of the trade, prices have still a downward tendency, and important reductions in fuel and labour are declared to be very near at hand. Common unmarked bars have this week changed hands at £7 10s. per ton, and nail sheets have been dealt in at £9; but in both these descriptions of iron competition is now very keen, not only with the North of England, but on the part of Belgian producers, who are sending increased quantities of iron into this district; but for the leading brands of South Staffordshire iron prices are fairly well maintained on the standard of £10 per ton for bars. In pig iron the market appears to be more seriously depressed from week to week, and, notwithstanding the great curtailment of production which has lately occurred, stocks continue to accumulate, and the number of furnaces which are standing idle is rapidly increasing.

The coal market is naturally very adversely affected by the depression in the iron trade, and prices for all classes of manufacturing fuel are weak and irregular; but the demand for household qualities is for the moment stronger, and prices are tolerably well maintained.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of this district remains in the depressed condition which I have noticed in previous reports, and the demand for round coal is very much below the average for the time of the year. Notwithstanding that the pits, in the majority of cases, are not working more than six and seven days to the fortnight, supplies are abundant in the market, and prices are naturally weak. Nominally quotations are without change, but list rates are no guide whatever to the actual selling prices, which are very irregular; and at the same firms, and for the same class of coals, prices, in some cases, vary as much as 1s. 6d. per ton. So far as the average quotations now ruling for round coal are of any value, they may be given at the pit mouth, in the Wigan district, at about 12s. 6d. to 13s. 6d. for Arley coal, 10s. to 11s. for Pemberton four-feet, and 7s. 6d. to 8s. 6d. per ton for common coal. The extreme quietness in the coal trade is causing the production of engine fuel to be so limited, that the demand for good qualities is rather in excess of the supplies, and prices have a stiffening tendency. Good burgy is a trifle firmer, and is quoted at from 6s. to 6s. 6d. per ton; and in some cases, for the best qualities, 7s. per ton is asked. For good slack, colliery proprietors generally have no difficulty in maintaining the late advanced prices, and good qualities are quoted from 4s. to as high as 5s. and 5s. 6d. per ton at the pit.

The shipping trade continues very flat, and there is little or nothing doing at Liverpool. Lancashire colliery proprietors being almost out of the market, owing to the extremely low prices at which South Wales and north country coals are now offering.

The coke trade shows no signs of improvement. There is still very little demand in the market for this description of fuel, and best Durham foundry cokes delivered here are offering at 23s. per ton, and Lancashire ditto at 22s. to 22s. 6d. per ton.

There has been very little demand for either pig or manufactured iron in this market during the past week, and prices all round are easier. Lancashire makers, although they have not made any material alteration in their quotations, are open to offers at lower prices, and in other brands, merchants are offering speculative lots, at very much below the nominal current rates. In manufactured iron, Lancashire and Middlesbrough bars delivered into the Manchester district can now be got for £7 12s. 6d.; Sheffield, for £7 15s.; and Staffordshire, for £7 17s. 6d. per ton. Puddled bars delivered are quoted at £5 10s., and ship plates and angles at £8 12s. 6d. per ton.

Both furnace and forge proprietors are gradually working off their old orders with very little new business coming in, and the prospects for the future are far from encouraging.

It is rumoured that one of the local railway companies contemplate reducing their rates for the carriage of coal; and there is an agitation amongst makers and merchants for a similar step with regard to the iron brought into this district.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

We have now entered upon the third week in March, and the prospects of the spring business in coals have not been so bad for several years as they continue to be upon Newcastle Quay. The coal trade is in a very depressed state, especially amongst the second-class pits. The entire trade in second-class coals seems, for the present, to be a matter of bargain. Prices are pretty much like what is often seen placarded in draper's windows—"No reasonable offer refused." The steam coal business is miserable; gas and household coals are becoming quieter, and in less demand. A few foreign contracts have been secured in gas coals for the Baltic; but it is evident, after the close of this month, considerable difficulty will be experienced in maintaining present rates for them. Nearly all classes of second-class collieries are making very bad time. The only pits which are working up to the standard of ten days per fortnight are a few of the best gas and household collieries.

Business still favours shippers. The lower Baltic trade has opened out lower than last year, with a worse homeward business. Coasting freights, last week were below the quotations of the previous week. Steamers were freighted for London at the miserable figure to shipowners of from 4s. 3d. to 4s. 6d. per ton, with very low rates to Hamburg, France, the Baltic, and the Mediterranean. Handy coasting sailing ships could not find employment, and for several days there was not a freight in the market for London, Yarmouth, Lowestoft, or the east coast generally. Some small ships were inquired after to load gas coals for Waterford, at £9 per keel, and Sligo at £9 10s. per keel. There is a general impression that this bad business will last till June, and merchants and shipowners take a very gloomy view of the situation. There are plenty of steamers and sailing ships in the Tyne unchartered.

The iron trade of the North of England is a trifle better in some of its branches, but the complaint is general of a want of profitable business. The contracts that are taken, it is alleged, are cut so fine that the manufacturer can get nothing out of them. The Carlist War being over, there is a prospect of a better trade with Spain, which is rich in minerals and other produce used by manufacturers in the North of England. There is also a fair prospect of shipments of coke thence for the lead and copper works. The chemical trade of the Tyne was a trifle improved last week, and, on account of some special orders which have come to hand, there is more animation in the iron shipbuilding trade of the Tyne.

The coopers are still on strike at the chemical works, and on account of the strike of the masons and bricklayers of Newcastle, building is stopped there.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Sir Windham Anstruther's gas bill is now exciting a considerable amount of interest throughout Scotland. As was to be expected, the Burgh Commissioners of Wishaw have gone in heartily for the scheme proposed by the bill. Bailie Anderson, who moved that a petition be presented in its favour, said the probability of its passing had already told favourably upon the gas consumers of the burgh of Wishaw. They used to be charged 50 per cent. more than was paid in the neighbouring burgh of Hamilton, and now they only paid 15 per cent. more. Mr. Thomson thought there were two objectionable clauses in the bill, and they were of such a nature that they would enable consumers of gas to have it cheap at the expense of the non-consumers. Bailie Anderson said he had spoken to Sir Windham Anstruther on that subject, and he was in favour of an alteration, if he could get those members who were working with him to comply. Mr. Smith considered that what had led to the introduction of the bill into Parliament was the application of the Commissioners to the Wishaw Gas Company for a gas supply in their recently-extended boundaries. The gas company's offer was of such a nature that the commissioners could not entertain it, and he (Mr. Smith) believed that led Sir Windham to introduce his bill.

The Town Council of Airdrie have remitted the bill to the consideration of a committee, who are to deal with it as they may think proper.

At their monthly meeting, held last Monday night, the Town Council of Ardrossan had the bill under consideration, when they declined to petition in favour of it.

On Wednesday the Town Council of Ayr and the Johnstone Police Commissioners resolved to petition in favour of it.

On Tuesday, at a private meeting, the Lord Provost's Committee of the Town Council of Edinburgh decided, by a majority of one, to recommend the council to petition in favour of the bill.

Very decided opposition has been resolved upon by the Police Commissioners of Maryhill. At a special meeting of that body lately held to consider the provisions of the bill, it was considered that several of the clauses were not only highly objectionable, but rather sinister in their design. It was unanimously agreed to take joint action with the neighbouring burghs, as might appear most desirable, either to have the bill opposed, or such amendments introduced as should protect the rights and interests of all the burghs concerned. Provost Shaw and Bailie Murray were appointed a committee with full power to act with the representatives of the other burghs. It was the opinion of all the commissioners present at the meeting, that the bill, as it stood, was a covert attack on the independence of Maryhill and the neighbouring burghs, and they were at a loss to conceive what motive Sir Windham Anstruther could have for playing into the hands of the Corporation of Glasgow at the expense of the outside burghs, Glasgow being, they held, the only corporation in Scotland which could gain by the clauses objected to.

Notwithstanding the low price and the high illuminating power of the gas supplied by the Town Council of Hamilton, there are still some of the consumers who are not satisfied; indeed, dissatisfaction is being expressed even among the Gas Commissioners themselves. At the last meeting of the Town Council, the treasurer for the burgh called attention to the fact that numerous complaints were being made regarding the quality of the gas. Mr. Tanish, the convener of the Gas Committee, said he believed that the fault was with the fittings and burners, and was of opinion that if they were looked to, the quality of the gas would be found to be all right. Mr. Rae, while admitting that a good deal depended upon the condition of the fittings, thought that the illuminating power of the gas should be raised to 30 candles, instead of 28. No resolution was come to on the subject.

A fire occurred at Kilmarnock on Thursday morning, which excited great consternation, owing to the danger of the fire extending to the corporation gas-works, immediately adjoining the burning building. The efforts of the firemen were first directed to prevent the flames from communicating with the stores of naphtha, &c., while, at the same time, the gas manager, Mr. Dalziel, took the precaution to empty the large gasholder. Fortunately, these efforts were successful in saving the gas-works.

The Edinburgh and District Water Trust met on Thursday last, when it was agreed to accept an offer for the construction of a reservoir and other works at Alnwick Hill, at a cost of £54,000, as recommended by the Works Committee. A report upon the progress of the Moorfoot Water-Works was submitted by the engineers, Messrs. J. and A. Leslie.

It is scarcely expected that Mr. Bateman will be able to undertake the works for the proposed water supply for Forfar, as he has gone to the South of France, owing to serious illness.

There has been some fluctuation in the price of pig iron during the past week, and some of the makers special brands have been decidedly reduced in price. The market closed on Friday with sellers 59s. 1½d., one month fixed, buyers 58s. 10½d. The coal market still retains its languidness, with no apparent sign of change. Some coalowners have ceased operations at their pits, the losses being too great with the present low range of prices.

BROADSTAIRS GAS COMPANY.—The meeting of shareholders was held on the 7th inst., and a dividend of 7 per cent was declared.

ABERDARE LOCAL BOARD WATER-WORKS.—The contracts for the pipe-laying amounting to 23,000 yards, undertaken by Messrs. Chandler and Sons, of York Street, Southwark, have been completed within the time specified, although we hear that considerable time was lost through non-delivery of pipes.

BIRMINGHAM WATER SUPPLY.—Dr. Hill, the medical officer of health for Birmingham, reports that the water supplied to that town during February was "pretty clear," and showed a diminution in the quantity of nitrogen as nitrates, compared with the water delivered during January.

CUCKFIELD GAS COMPANY.—The annual meeting was held on the 7th inst.—Mr. West in the chair. The directors announced that they reduced the price of gas at the beginning of the year, and they were happy to state that there had been a good increase in the consumption of gas. The accounts showed a disposable balance of £181 9s. 9d., and the directors recommended that a dividend at the rate of 5 per cent., free from income-tax, be declared, and a sum of £50 carried to the reserve-fund. The balance-sheet showed the receipts to have been £794 3s. 6d., and the payments £867 17s. 10d.; leaving a balance due to the Treasurer of £73 14s. 4d. There was a balance in hand at the commencement of the year of £36 10s. 8d. A dividend of 5 per cent. was declared; and £50 was carried over to the reserve-fund. The Rev. E. A. Maberly and Mr. Best, the retiring directors, having been re-elected, the usual votes of thanks were passed.

INSTITUTION OF CIVIL ENGINEERS.—At the meeting of this society on Tuesday, the 7th of March—Mr. George Robert Stephenson, president, in the chair—the following gentlemen, among others, were elected—viz., Mr. Alexander Duncanson, deputy water engineer, Liverpool, as a member; and Messrs. James Lawrence Chapman, resident engineer of the Harrow District Gas-Works; Alfred Colson, Gas-Works, Birmingham; Thomas Colson, Singapore Water-Works; William Hay Fea, assistant engineer to the Corporation of Hull; William I'Anson, Cleveland Water Company, Saltburn-by-the-Sea; and Edwin Kenworthy, engineer to the Corporation of Barnsley, as associates. A compliment has recently been paid to this body by the King of Portugal, who, in recognition of services rendered to the civil engineers of his kingdom, has named Mr. James Forrest, secretary of the institution, a Commander of his Military Order of Jesus. Mr. Forrest was, on a former occasion, appointed by the Emperor of Brazil a Knight of his Imperial Order of the Rose.

HULL GAS SUPPLY.—Mr. James Baynes reports that the gas supplied to the district of Soulcoates and Myton during February by the British Gas Company averaged 16·17 candles illuminating power. Free ammonia and sulphuretted hydrogen were at no time present to the ordinary tests. The results for the month are—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·59	15·68	16·17
Grains of sulphur per 100 feet	32·30	27·50	29·40

Mean barometer and temperature in experiment-room:—Bar., 29·77; tem., 57°. In the *East District*, Mr. James Baynes, jun., reports that the gas sent into this district by the Sutton, Southcoates, and Drypool Gas Company during February possessed a fair illuminating power, whilst the sulphur compounds were low. Results as follow:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·17	15·21	15·65
Grains of sulphur per 100 feet	—	—	5·10

Mean barometer and temperature in experiment-room:—Bar., 29·84; tem., 52°.

NATURAL GAS FURNACES.—The constantly increasing utilization of natural gas for industrial purposes, throughout the oil region of Pennsylvania and its neighbourhood, is attracting much favourable comment. The success of the puddling and heating furnaces at Erie, Leechburgh, and elsewhere in Pennsylvania, where the experiment has been thoroughly tried, seems to have attracted a widespread interest to the subject, and we now learn of schemes on foot to utilize the gas upon a large scale. Near Beaver Falls, the gas issuing from a well 1100 feet deep is employed in a file factory at that place. It is also reported that the product of the great gas-well in Butler County, Pa., will be brought to certain iron-works in Pittsburgh. The work of laying a pipe, 6 inches in diameter and 17 miles long, is said to be contracted for, to be finished within a month. It is further reported that a project is being mooted to purchase all the gas-wells in Butler County, and bring their product to the Pittsburgh manufactories. This last scheme, if successfully realized, would work quite an industrial revolution. But, whether feasible or not, the agitation of the subject is an indication that the question of utilizing the enormous volumes of valuable heating gas, which have, until the present, been allowed to go to waste, is at length receiving the attention it deserves.—*American Exchange and Review.*

ACKWORTH, FEATHERSTONE, PURSTON, AND SHARLSTON GAS COMPANY, LIMITED.—The half-yearly meeting was held at Purston on the 6th inst.—Mr. A. Wardman in the chair. From the accounts read by Mr. Wrae, the secretary, it appeared that the amount expended on the works up to June, 1875, was £5758 0s. 9d., and £21 7s. was expended during the last half year on land and buildings; £130 on mains and machinery; £82 17s. for meters, services, &c.; and sundry accounts amounted to £30 13s. 11d. The amount of capital paid up is £4980, or 1000 shares at £5 each, less £20 unpaid. The balance of unprovided capital was reported to be £1034 15s. 4d. The revenue account showed that the receipts for the half year amounted to £386 1s. 9d., being as follows:—Gas accounts, £336 15s. 2d.; meter-rents, £9 2s. 10d.; coke accounts, £21 8s.; tar, lime, and ammonia, £18 8s. 5d.; and discounts, 7s. 4d. After paying all expenses, the balance of profit was £131 16s. 6d.; and although this would allow a dividend of 5 per cent., it was agreed to pay 2½ per cent. on the 1st of next month, and to carry forward the balance. The chairman, in moving the adoption of the accounts, reported that everything in connexion with the works was satisfactory. The leakage, which was some time ago 25 per cent., had lately been considerably reduced, the works were in good order, and all was going on in a proper manner. The accounts were adopted, Messrs. Cowling and Waller—the two retiring directors—were reappointed, Mr. Samuel Day was again elected auditor, and the meeting was brought to a close with a vote of thanks to the chairman and directors.

BARNSLEY GAS COMPANY.—The annual ordinary meeting was held on Monday, Feb. 21—Mr. T. Cope in the chair. The directors in their report expressed their regret that the net income realized for the past year would not allow of a balance being carried to the reserve-fund, as in the year 1874; but that, on the contrary, that fund would have to be resorted to, if the maximum dividends authorized by the company's Acts were to be paid. The directors, however, reminded the shareholders that at the last annual meeting the possibility was foreshadowed that the company might possibly not earn, during the then current year, an income sufficient to meet the amount required for the full rate of dividends; inasmuch as it was the first whole year in which the company would feel the full force of the greatly increased price of coal, an increase amounting to more than 100 per cent., and also of the decrease in the price which they could obtain for their coke, a decrease of a like per centage. On comparing the balance-sheet now submitted, with that for the year 1874, it would be found that the amount paid for coal during the past year had exceeded that of the former by no less a sum than £1811 15s. 5d. But as it might fairly be anticipated that the price of coal would for some time decrease rather than increase, and as the revenue from the sale of gas had increased by nearly £1000, notwithstanding the loss sustained by large consumers having worked short time only, during a great part of the year, the directors saw no reason whatever for taking an unfavourable view of the company's prospects; for, assuming the sale of gas increased in the steady ratio it had now done for several years, there should at the end of the present year be no inconsiderable balance to carry to the reserve-fund. The directors, therefore, recommended the payment of the maximum rates of dividend on the called-up capital. This necessitated the withdrawal of £530 5s. 6d. from the reserve-fund, but as there was on the 31st of December last a stock of coal, &c., on hand of the value of £331 13s., the amount permanently withdrawn would only be £198 12s. 6d. The directors had to report the works to be in a thorough and efficient state of repair, except the smallest of the gasholders at the Pontefract Road works, which was worn out.

LONGTON GAS COMPANY.—At the meeting of the shareholders of this company last week, the following report of the directors was presented:—"Under the head of capital account appears the amount expended in the extension of the company's mains to Blyth Bridge, and the directors have to report the completion of this work, and that there is a satisfactory demand for services to supply gas to houses at Blyth Bridge and Blyth Marsh. An addition has been made during the past half year of 42 retorts to the retort-bench, which is now quite ample for the next three years. A new condensing main has also been put up, and a large scrubber is being erected. From the revenue account it appears that after providing for deterioration of plant, a profit of £2239 8s. 3d. has been made in the past half-year. After payment of interest on mortgages, there remains a sum of £2163 8s. 4d. to pay dividends, which will take up £1555 1s. 8d., leaving a sum of £608 6s. 8d. to be carried forward to the profit and loss new account. The directors recommend that the usual dividends of 10 and 7 per cent. per annum on the original and ordinary 7 per cent. shares respectively, and the dividend of 5 per cent. on the ordinary shares, all free of income-tax, be declared at the half-yearly general meeting. The Longton Town Council have applied to the Local Government Board for sanction to raise a sum of money for the purchase of the gas-works, and on the 27th of October last an inspector from the Local Government Board held an inquiry at the Court House, Longton, for the purpose of hearing evidence in reference to this matter. Due notice will be given to the shareholders as to the time of the transfer of the works.

NOXIOUS VAPOURS.—A petition has just been presented to the House of Commons by the Lancashire and Cheshire Association for Controlling the Escape of Noxious Vapours and Fluids from Manufactories, and others, praying for relief. The petitioners, being owners or holders of land in the neighbourhood of the alkali and copper works at Widnes, St. Helen's, Runcorn, and other parts of Lancashire and Cheshire, state that they are suffering most serious injury from the noxious vapours and fluids issuing from those works, which threaten to make much of the land in the neighbourhood almost valueless. The petition states that, by passing the first Alkali Act, in 1863, the Legislature admitted the existence of the evil by requiring the manufacturers to condense 95 per cent. of the acids passing into their chimneys, and appointing an inspector to see that regulation observed. That this Act was amended by another Act in 1874, which brought in, for the first time, the smelting of copper by the wet process, and requiring the manufacturers to condense their gases still further by not allowing more than one-fifth of a grain per cubic foot, or about 2½ per cent. of the gases, to escape by each chimney. That in 1863, when the alkali trade was almost new, the manufactories of soda and copper were comparatively few in number; but those trades being highly remunerative, the number of works has become very great, and is every year increasing. That while the works were few, the permitted maximum of gases allowed to escape, though undoubtedly injurious, was as nothing compared with the immense volume of gases thrown up now that the chimneys have become so numerous. That the escaping vapours, consisting of sulphurous and sulphuric acid, nitric acid, and the acids of nitrogen, chlorine, and sulphuretted hydrogen, possess a character destructive of vegetation and injurious to health, and affect the neighbourhood for several miles about the works, more particularly in the direction of the prevailing winds; and woods and trees, until lately healthy and flourishing, on both sides of the Mersey, have fallen victims to their influence and been killed. That neither of the Acts which have been mentioned includes the dry process in smelting copper, the fumes of which are highly deleterious; that neither of them takes account of the escapes of gas in drawing the charges, or of the fumes escaping by the chimneys at night, or of the fumes escaping night and day from the great mounds of waste around each work, or of the fœtid streams which flow thence in wet weather, nor does either Act require a self-registering apparatus, such as is used in gas and water works, for measuring the total escape of gases up the chimneys, nor does it give the inspector or his sub-inspector any adequate power, by fine or otherwise, to punish offenders for bad working, either by carelessness, negligence, or bad construction of works. That, in the opinion of the petitioners, science, which is the author of the works which cause these great annoyances, has in her stores a remedy for them, and that it might be invoked to find it by the offer of a national reward—such as was done when it was desired to find a mode of discovering the longitude at sea, and in some other cases of national importance like the present.

WINDING-UP OF THE BIRMINGHAM GAS COMPANY.—On the 25th ult., a meeting of shareholders was held for the purpose of taking the necessary steps for the winding-up of the business of the company. Mr. J. T. Collins occupied the chair, and the following statement of accounts was presented:—

Dr.			
Dividend declared Oct. 11, 1875	£23,492	0	0
Directors fees to date of resolution winding up.	276	3	3
Expenses of liquidation and advertisements.	317	10	0
Amount to be invested for the prosecution of Joseph Harrison	100	0	0
Balance	6,526	13	6
	£30,712	6	9
Cr.			
Balance brought from revenue account	£29,916	13	10
Balances remaining on capital account	699	0	0
Interest from bankers	96	12	11
	£30,712	6	9

The meeting having adopted this statement of accounts, and approved of the distribution made by the directors of the sum of £2600, left in their hands by the shareholders at a former meeting for distribution among the various officers of the company, the following resolution was unanimously passed:—"That in recognition of the able and disinterested advice and assistance rendered by Mr. G. J. Johnson, solicitor to the company, particularly in connexion with the recent transfer of the company's business to the Corporation of Birmingham, he be requested to accept the best thanks of the shareholders and an honorarium of 250 guineas, to be paid in addition to the ordinary legal charges." A further resolution was adopted, allotting a sum of £500 to the directors to dispose of as they might think proper. In acknowledging this, the chairman took occasion to remark that, at the time of the purchase of the undertaking, the company was greatly strengthening itself, and was making rapid progress. Had another year elapsed, they should have been in a position to make far different terms; but as they were, the terms were not so very bad, for at the time the arrangements for the purchase were made, the shares were standing in the market at £44. Shortly after the purchase was concluded, they arrived at the figure of £58. Further than that, they paid, during the last year, £10,000 additional, by way of dividend. They had, therefore, in winding-up, made some substantial returns. He then moved—"That the balance remaining, after the foregoing amounts are paid, be rateably divided among the shareholders in proportion to their capital." They had no desire to keep money in hand, and, that being done, the company would be virtually dissolved. A meeting could be called to receive final accounts, and the old Birmingham Gas Company, with which he had had many pleasant recollections, would merely be a matter of history—a thing of the past. In reply to a question, the chairman explained that the amount to be divided was £5000. The resolution was adopted, and a vote of thanks to the chairman concluded the proceedings.

PARAFFINS AND THEIR ALCOHOLS.—At the Royal Institution, on Friday evening, March 3rd.—Dr. Odling, F.R.S, delivered a lecture on this subject. He commenced by referring to the large group of hydrocarbons generally, pointing out that chemists are now acquainted with many hundreds of compounds of hydrogen and carbon, while still there are but two compounds known of hydrogen with oxygen, and two of carbon with oxygen. There is hardly a chemist who has done any original work but has added to our knowledge of the hydrocarbons. While most of them readily enter into combination to form further compounds, there is one easily recognizable group that does not, and the members of this group, from their slight affinity for combining, are called paraffins. Hydrocarbons of this inactive chemical habit are some of them solid, some of them liquid, whether spirituous or oily, and some of them gaseous. The best known of the gaseous paraffins is marsh gas—the inflammable gas of coal mines, and most abundant constituent of ordinary coal gas. Of the liquid paraffins, the most dense varieties are used as lubricating oils; the intermediate varieties are used as burning oils, and such is now the perfection of mechanical skill that their use is not attended by danger or even offensive smell. A collection of paraffin lamps, lent by Messrs. Gardner, was displayed in the ante-room. The highest and most volatile varieties constitute benzoline, a liquid of many uses in the arts, but exceedingly dangerous for lamps. Some cannon-like explosions were produced by igniting a little benzoline on cotton wool diffused in a jar of oxygen. The solid paraffins are largely used in the manufacture of candles. The paraffins are the most highly hydrogenized of the hydrocarbons, and hydrocarbons not belonging to the paraffin class become converted into paraffins by their direct or indirect fixation of additional hydrogen. The study of the proportion in which the relative amount of hydrogen and carbon occurs has been of inestimable value in affording a key to the solution of many difficult problems in organic chemistry. In all the paraffins—gaseous, liquid, or solid—it has been found that the number of their proportions of hydrogen exceeds by two proportions twice the number of their proportions of carbons. The different methods of obtaining these so-called synoptic formulæ were referred to in order to show that they really are expressions of well-ascertained facts. From the time this has been established, the chief interest of the paraffins to the chemist has been the study of their isomerism. For example, though the compounds carbon 1, hydrogen 4; carbon 2, hydrogen 6; and carbon 3, hydrogen 8; apply each of them, so far as is known, to a single paraffin only, the formula carbon 4, hydrogen 10, applies to two distinct compounds; the formula carbon 5, hydrogen 12, to three distinct compounds; the formula carbon 6, hydrogen 14, to five distinct compounds; the formula carbon 7, hydrogen 16, to eight distinct compounds; and so on. Thus there are two distinct gases or highly volatile liquids known, expressible by the formula carbon 4, hydrogen 10; the less volatile of them, normal butane, boils at 1° above freezing point; the more volatile, isobutane, boils at 15° below, and further the similar derivatives obtainable from the two butanes by similar processes present corresponding differences in their properties. Thus the butyric acid obtainable from normal butane is of specific gravity 981, boils at 163°, and yields a calcium salt which crystallizes with one proportion of water, and is more soluble in cold than hot water, while the butyric acid obtainable from isobutane by exactly the same process, and having the same composition, has a specific gravity 959, boils at 154°, and yields a calcium salt crystallizing with five proportions of water less soluble than the other, but following the usual rule with regard to hot and cold water. Many other similar instances were adduced in illustration. Such facts, gradually acquired by the continued labour of many patient investigators, Professor Odling spoke of as making known one of the most remarkable phenomena, and offering one of the most suggestive problems of modern organic chemistry. The study of the conversion of paraffins into alcohols is of great interest, and, as far as is known, there appear to be as many isomeric primary alcohols as there are isomeric paraffins. Some have primary and secondary alcohols, some primary and tertiary, some primary, secondary, and tertiary. The study of these, more than perhaps anything else, helps to increase our knowledge of organic chemistry.

FATAL GAS EXPLOSION AT LEEDS.—The adjourned inquiry into the circumstances attending the death of a railway guard named Booth, by an explosion of gas at the Midland Railway Station, on the 10th ult., was resumed by the Leeds deputy-coroner on Wednesday last. The evidence of a clerk who, at the time of the explosion, was in charge of the parcels office, showed that there being a slight smell of gas, a man named Midgley, a plumber, was sent for to search for any escape. He did so with a lighted paper, with the results already reported. The jury then proceeded to the infirmary and took the evidence of Midgley, who was himself seriously injured by the explosion. He stated that when he was called into the inquiry office he examined one of the gas-pipes by smelling, and could not detect any escape. He went behind the door, and examined the pipe there, from the top to the bottom, with a light. When he reached the floor of the room the gas exploded. There was only a slight smell of gas, and nothing to lead him to apprehend any danger. He had been employed in finding out many escapes of gas, having been a plumber since he was fifteen years old. Thomas Lawrence, the parcels clerk, who is likewise still confined to the ward from his injuries, also was examined. At the former hearing, a gas-fitter named Gresham stated that he made an examination of the gas-fittings soon after the explosion occurred. The gas-pipe had been laid over a brick drain, and the settling of the ground had caused the pipe on one side to bend and crack. The gas, of course, escaped, and there being no outlet above ground, worked its way under the floor of the inquiry office. The crack was about 9 feet from the office wall. The pipe was of the usual kind, and in good condition. It had been there, he believed, for 22 years, and he had never had occasion to examine it. If the smell of gas had been strong, he should not, as Midgley did, take a naked light to find out the escape. In some cases, however, he did so; it all depended upon the degree of the smell. John Reid, gas engineer to the railway company, said that there was a staff of eight men at Leeds, and when anything went wrong in connexion with the gas, it was their duty to repair it. Midgley had no right whatever in the inquiry office. The gas service-pipe to the office was as good as when it was first laid down. They had no record of how long it had been under ground, but it was not corroded in the slightest. The pipe must have broken during the night before the explosion, as the broken surface appeared perfectly fresh. Joseph Lindley, a plumber, said that he had examined the premises where the explosion occurred, and found that the service-pipe was broken by the settling of the ground. The pipe was of the usual thickness. The fracture appeared to be of very recent date, because, had there been an escape for some time, the broken surface would have been black. If he had been called to examine the office, and had found that there was no serious smell of gas, he would have had no hesitation in applying a light to search for the escape. Thomas Storer, a plumber, who examined the premises with the last witness, gave corroborative evidence, and, in answer to Mr. Pullan, said that the instructions he gave to his men were, that when they found that there was a strong smell of gas, they were not to apply a light immediately, but first turn off the gas, take up a board, then turn on the gas and apply a light. This concluded the evidence, and the deputy-coroner, in charging the jury, told them that, assuming they were satisfied the deceased was killed by the explosion, the two important questions for them to consider were—1. What was the cause of the explosion? 2. Is any person criminally responsible for the death of the guard? With respect to the first question, no doubt the primary cause of the explosion was the fracture of the pipe and the escape of gas therefrom, and the immediate cause was the application of the light by the plumber when he was searching for the place of escape. With respect to the second question—as to whether any person was criminally responsible—in order to make the plumber so liable, the jury must be satisfied that he was guilty of gross and culpable negligence in what he did; and, in deciding that point, they must consider whether he acted according to the usual practice of plumbers in such cases. The impression upon the plumber's mind clearly was that there was no danger, otherwise he would not have risked his own life as he did. There was also the fact that the great danger was hidden, because if there had been a very large amount of gas in the office, the deceased and the others could not have stayed there as they did; therefore, although there was a very large amount of gas under the boards, the quantity which escaped into the office must have been comparatively small, and the great danger was not obvious to the plumber, and, under that impression, he acted as plumbers usually do in such cases—as was proved by Storer and Lindley, both of them men of great experience. The jury had, of course, nothing to do with the question as to whether the railway company were liable for damages. The jury, after a short deliberation, returned a verdict of "Accidental death."

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

848.—BANKS, C., Birmingham, "An improved tap for water and other liquids." Feb. 29, 1876.

858.—STRONG, M. H., Brooklyn, New York, "Improvements in the manufacture of gas for illuminating and other purposes." Feb. 29, 1876.

869.—HALLSWORTH, S., and BAILES, R., Leeds, "Improvements in purifying illuminating coal gas, and in the preparation of the means employed therefor." March 1, 1876.

876.—BLEWITT, R. J., Upper Norwood, Surrey, "Improvements in the method of obtaining gas for illuminating purposes, and of obtaining and applying the products of coal by distillation of the same." March 1, 1876.

934.—WHEELER, H., Birmingham, and PEARSON, J., Handsworth, Stafford, "Improvements in direct-acting steam-pumps." March 4, 1876.

940.—BRAY, G., Leeds, "Improvements in gas-burners." March 4, 1876.

949.—STUART, C., Halifax, "Improvements in the construction of taps or valves for controlling and regulating the flow of steam, water, gas, or other fluids." March 6, 1876.

961.—PLUSH, R. H., Liverpool, "Improvements in pumps." March 6, 1876.

968.—SMITH, W., Kennington, London, "Improvements in dry gas-meters." March 6, 1876.

970.—SUGG, W. T., Westminster, London, "Improvements in gas-burners and fittings, or parts thereof, and in the method of manufacturing the same." March 6, 1876.

971.—SUGG, W. T., Westminster, London, "Improvements in public light gas-meters, the receptacles for containing them, and connexions to the same." March 6, 1876.

983.—LAKE, W. R., Southampton Buildings, London, "Improvements in gaseliers." A communication. March 7, 1876.

989.—CROSSLEY, F. W., and BRIDGETT, G. A., Manchester, "Improvements in direct-acting steam-pumps, applicable also to pumps worked by compressed air or other fluid pressure." March 7, 1876.

1003.—WRIGHT, L. T., Harrow Road, London, "A new process for revivifying foul gas lime, and obtaining the volatile products therefrom." March 8, 1876.

1013.—CALDWELL, A., Strathbungo, Renfrew, "A new or improved apparatus for controlling or regulating the flow of water or liquids in dwelling-houses, factories, and other buildings, the same being applicable as a water or liquid meter." March 9, 1876.

1014.—HOEFTMANN, O., Charlton, Kent, "Improvements in gas lighting, which consist in adjusting the supply of air to the burner so as to give maximum light for a given consumption of gas." March 9, 1876.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3162.—CLARK, A. M., Chancery Lane, London, "Improvements in treating sewage and other impure or polluted waters." A communication. Sept. 8, 1875.

3178.—BORLAND, J., Bexley Heath, Kent, "Improvements in hydrocarbon furnaces, and in means for producing light and heat." A communication. Sept. 10, 1875.

3188.—SHANKS, A. F., Barrhead, Renfrew, "Improvements in and connected with water-closets, urinals, cisterns, baths, valves, and other apparatus in which water is consumed, contained, conveyed, or controlled." Sept. 11, 1875.

3199.—WILLIAMS, W., Liverpool, "Improvements in laying and joining pipes and tubes for tunnels, water and gas pipes, pneumatic tubes, and similar purposes." Sept. 13, 1875.

3220.—WHITAKER, J. W., Wakefield, "Improvements in apparatus for charging gas-retorts." Sept. 15, 1875.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

576.—EMMENS, S. H., "Improvements in apparatus for producing heat and light." Feb. 15, 1873.

591.—HENDERSON, A. C., "Improvements in the purification of water and apparatus connected therewith, together with the mode of cleansing the same." Feb. 18, 1873.

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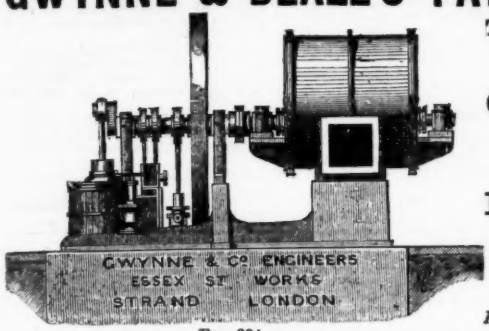

FIG. 224.

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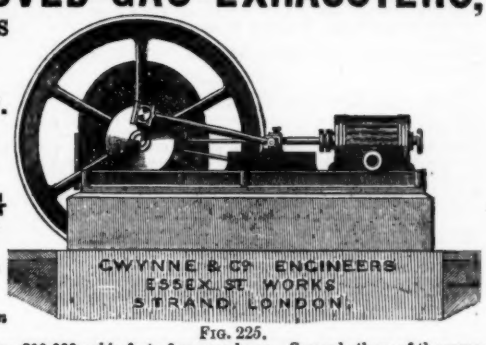

FIG. 225.

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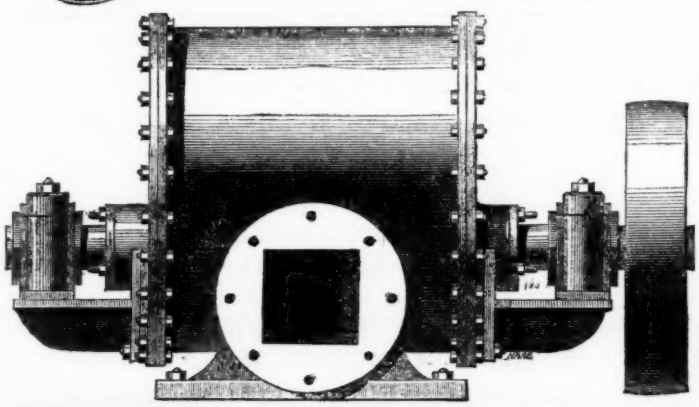

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WANTED, by a Gas Company in South Wales, MAIN and SERVICE LAYERS; also a FITTER, used to compo', lead, and iron fitting, gas, steam, and water joints.
Address No. 255, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Smith who can lay Mains and Services, assist at interior fitting, and make himself generally useful.
Apply, with references, and stating wages, to Mr. GEO. SMEDLEY, Gas-Works, BUXTON.
March 10, 1876.

WANTED, second-hand Annular ConDENSERS, SCRUBBERS, and PURIFIERS, large enough to pass about 100,000 feet of gas per diem.
Send price and particulars of each separately to DAVID WHITE, Water and Gas Works, Bangor, CARNARVONSHIRE.

WANTED, GAS-WORKS ON LEASE.

A MANAGER, of many years experience, wishes to LEASE a small Gas-Work. A fair interest will be given.
Address No. 249, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PUPIL WANTED.

A London Gas Engineer, having charge of extensive Gas-Works in the Metropolis, is in want of an intelligent Youth as PUPIL. A good opportunity will be afforded for learning practical Engineering and Gas Manufacture, as also the Chemistry of Gas Lighting, Drawing, &c. A premium will be required.
Address No. 254, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the Stratford-upon-Avon Gas Company invite TENDERS for the whole of the AMMONIACAL LIQUOR and the surplus TAR produced at their works for One, Two, or Three years. Accommodation for loading either by rail or canal. Tenders received up to the 31st inst.
The Directors reserve the right of accepting the highest or any tender.
For further information apply to J. S. CRANMER, Manager.

ON SALE, cheap, Four second-hand PURIFIERS, 10 ft. square, with dry centre-valve and lifting gear. Thorncliffe make.
Apply to Mr. LONGWORTH, Dukinfield, MANCHESTER.

FOR SALE—A 6-in. Governor, in good condition. Now replaced with a larger one.
Apply to Mr. W. DUFF, Manager, Gas-Works, MORECAMBE.

FOR SALE, in consequence of enlargements, Two PURIFIERS, 6 ft. square, with valves grids, covers, and lifting crane complete. Also Vertical Condenser, 8-in. pipes and chest, in good order.
Apply to W. EWART, Gas-Works, ANNAN, N.B.

FOR SALE, in consequence of enlargements, Four PURIFIERS, each 6 ft. square, 3 ft. deep, with 9 inches of a lute, centre-valve, and all connexions complete, and made by Hanna, Donald, and Wilson, of Paisley.
Apply to MANAGER, Corporation Gas-Works, LIMERICK.

GAS TAR FOR SALE.

THE Redruth Gas Company are prepared to receive OFFERS for about 25,000 gallons (more or less) of GAS TAR, now in stock, the Company delivering the same at the railway station here, in casks to be provided by the purchaser, who will pay all rail charges. Delivery to commence at once, and be completed within two months. Intending purchasers to give price at per gallon.
Offers will be received up to the 21st of March, 1876.

THE Gas Committee of the Corporation of Birmingham are prepared to receive TENDERS for the purchase of the SPENT OXIDE produced at their several works in Birmingham and at West Bromwich, for Twelve months, from the 1st of May next.
The quantity is estimated at from 2000 to 3000 tons per annum.
Tenders to be addressed to the Works Committee, not later than the 31st of March.
Further particulars may be obtained on application to the Secretary.
By order of the Gas Committee,
HENRY PARRY, Secretary.
Gas Offices, Old Square, Birmingham, March 1, 1876.

FOR SALE—A single-lift Gasholder, 60 ft. diameter, 16 ft. deep, with eight cast-iron columns, girders, and guides; also pulleys, rollers, and carriages complete and in good condition. Taken down for further extensions. Can now be seen at work near London.

Apply to Mr. DANIEL HOWARD, Gasholder Works, WEST BROMWICH.

FOR SALE—Four Purifiers, 12 ft. by 8 ft., with 12-in. connexions, hydraulic centre-valve and lifting crane complete; one Station-Meter in square cast-iron case, 10-in. connexions, to pass 10,000 feet per hour; and one 12-in. Governor. All the above are in excellent condition, and may be seen at work previous to their removal, as they are about to be replaced by larger.

Apply to WM. FLEMING, Gas-Works, LANCASTER.

THE Sheffield United Gaslight Company have for SALE the following Articles:—

The whole Manufacturing Plant, Gasholder, and Governor, of a small Gas-Work, capable of producing 10,000 cubic feet of gas per day. The gasholder is 27 ft. diameter by 14 ft. deep, cubic contents 8000 ft.

Connexions for ditto.

Four Purifiers, 12 ft. square, with 10-in. centre-valve and connexions.

Two Jones's Exhausters, each to pass 25,000 cubic feet per hour, with valves and connexions, in good condition.

Two 7-in. Governors.

One Battery Condenser, 60 ft. long, 12 ft. high, and 2 ft. wide, with 14-in. connexions and valves.

Seven Lengths Hydraulic Main, 7 ft. long, 18 in. diameter.

Nine Lengths Hydraulic Main, 7 ft. long, 14 in. diameter.

Twenty-seven Dip-Pipes, 4 in. diameter.

Twenty-seven Bridge-Pipes, 4 in. diameter.

Full particulars as to quality and price can be obtained on applying to Mr. T. ROBERTS, the Manager, Commercial Street, SHEFFIELD.

THE Directors of the Wareham Coal Gas Company are prepared to receive TENDERS for the supply of 300 tons of Pelaw Main GAS COALS (best quality), to be delivered, free of charge, into lighters at Russell Quay. At least 100 tons to be delivered by the 1st of June next, the remainder to be delivered by the 1st of September next.

Payment for the same will be made four months after delivery.

Tenders to be sent in to my Office before the 6th of April next.

F. FILLITER, Secretary.

Wareham, Dorset, March 7, 1876.

TO GAS CONTRACTORS AND OTHERS.

PORTMADOC GAS-WORKS.

THE Portmadoc Gas Company, Limited, are prepared to receive TENDERS for a LEASE of their GASOMETER and WORKS, for either 7 or 14 years, from the 1st day of October, 1876. Any person or company wishing to tender can receive particulars from the Secretary.

Sureties will be required.

Tenders must be sent in on or before the 1st of May next.

JOB THOMAS, Secretary.

Company's Offices, Portmadoc, March 7, 1876.

STOCKPORT BOROUGH GAS-WORKS.

TO CONTRACTORS, BUILDERS, AND OTHERS.
CONTRACT No. 1.

THE Gas Committee of the Corporation of Stockport are prepared to receive TENDERS for the excavating and building of a BRICK TANK, 144 ft. 6 in. diameter and 33 ft. deep, for their new works, Portwood, Stockport; also a Rubble Stone RETAINING WALL, about 100 yards long.

Drawings and specifications may be seen on application at the Heaton Lane Works, Stockport.

Sealed tenders to be sent in on or before Wednesday, April 5, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Tank and Wall."

The Committee do not bind themselves to accept the lowest or any tender.

Further particulars may be obtained from the Engineer.

By order,

JAS. JACQUES, Engineer and Manager.

Millgate Works, March 9, 1876.

STOCKPORT BOROUGH GAS-WORKS.

TO GASHOLDER MAKERS AND OTHERS.
CONTRACT No. 2.

THE Gas Committee of the Corporation of Stockport are prepared to receive TENDERS for the supplying, fixing, and completion of a Telescope GASHOLDER, the inner lift being 140 ft. diameter and 32 ft. 6 in. deep, with all necessary guides, wheels, columns, and girders complete, to be erected at their new works, Portwood, Stockport.

Drawings and specifications may be seen on application at the Heaton Lane Works, Stockport.

Sealed tenders to be sent in on or before Wednesday, April 5, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gasholder."

The Committee do not bind themselves to accept the lowest or any tender.

Further particulars may be obtained from the Engineer.

By order,

JAS. JACQUES, Engineer and Manager.

Millgate Works, March 9, 1876.

TENDER FOR GAS COALS.

THE Directors of the Petworth Coal Gas and Coke Company are open to receive TENDERS for a supply of 600 tons of best Screened Derbyshire Silkstone GAS COAL, to be delivered at Petworth Railway Station in such quantities and at such times as may be directed by their Manager, of whom further information may be obtained.

Tenders addressed to the undersigned, endorsed "Tender for Coals," on or before Thursday, March 23, 1876.

WALTER BUCKMAN, Secretary.

Petworth, Sussex.

TO CONTRACTORS, BUILDERS, AND OTHERS.

THE Gas Committee of the Bury Im-provement Commissioners are prepared to receive TENDERS for the excavation and construction of a BRICK TANK, 123 ft. diameter and 35 ft. deep.

Plans and specification may be seen, and form of tender obtained, at the Gas-Works, Bury, on and after Tuesday, the 14th day of March.

Sealed tenders, endorsed "Tender for Gasholder-Tank," to be delivered on or before the 30th day of March, addressed to the Clerk of the Bury Improvement Commissioners.

The Gas Committee do not bind themselves to accept any tender.

JOSEPH WOOD, Engineer and Manager.

Gas-Works, Bury, March 7, 1876.

TO CONTRACTORS.

THE Directors of the Town of Dudley Gaslight Company invite TENDERS for the construction of a brick GASHOLDER-TANK, 113 ft. in diameter and 31 to 32 ft. deep.

Specification and Drawings may be seen and copied on application at the Company's Office, on the works, on and after the 16th inst.

Sealed tenders, endorsed "Tender for Gasholder-Tank," and addressed to the Chairman and Directors of the Town of Dudley Gaslight Company, to be sent in on or before Tuesday, the 28th inst.

The Directors do not bind themselves to accept the lowest or any tender.

T. COLLETT, Secretary.

Gas-Works, Dudley, March 8, 1876.

SPONGY IRON FOR THE PURIFICA-TION OF GAS AND WATER.

BROOKE, SIMPSON, AND SPILLER, of 50, Old Broad Street, E.C., have purchased a patent for, and commenced the manufacture of, this product, and are prepared to enter into contracts for delivery.

WIDNES WATER-WORKS.

THE Widnes Local Board are prepared to receive TENDERS for the construction of a covered RESERVOIR (to contain 10 million gallons), to adjoin their present one on Pex Hill.

Plans may be seen, and specification and quantities obtained, upon a payment of two guineas (which will be returned upon receipt of a *bonâ fide* tender), at the Engineer's Office, Public Offices, Widnes, on and after the 15th inst.

Tenders to be addressed to the Chairman of the Gas and Water Committee, endorsed "Reservoir," and delivered at the above Offices not later than Ten a.m. upon the 3rd of April next.

The Board not bind themselves to accept the lowest or any tender.

HENRY ROBERTS.

Widnes, March 7, 1876.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—

A 6-h.p. Patent Trunk Engine. (Beale.)

Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Beale.)

Exhauster to pass 15,000 feet per hour. (Beale.)

An 8-h.p. Grasshopper Engine. (Easton and Amos.)

Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Easton and Amos.)

Exhauster, 20,000 ft. per hour. (Beale.)

Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.

Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.

Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.

Cast-iron Scrubber, 3 ft. diameter, 20 ft. high.

A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.

May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.

Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

March 10, 1876.

G. A. BAILEY AND CO., Machinists, Manufacturers of all kinds of Indexes for Gas and Liquid Meters, Tell-Tales for Turnstiles, on an improved principle. Every description of Wheel and Worm Cutting any size, &c.

56, Crampton Street, Newington Butts, LONDON, S.E.

N.B.—Country Orders executed with despatch.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

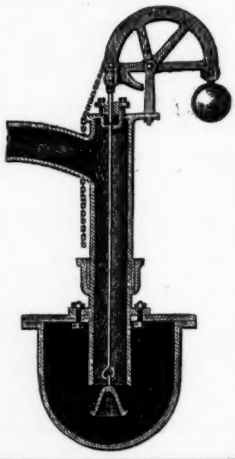
2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.



BOX'S
PATENT ANTI-DIP VALVE

Affords a clear gas way through the dip-pipe while the retort is in action, and produces a perfect seal at pleasure, or whenever the retort is open, offering absolute security against the drawing of air, however hard the engine is worked, and obviating the necessity for using any liquid in the now so-called hydraulic main, while it is at the same time capable of withstanding the heaviest back pressure. By its use, experience shows that the retorts are kept quite free from carbon. It is easy of application to existing apparatus, and is comparatively inexpensive. Is not likely to get out of order, as the tar, which will adhere to the bottom of the dip-pipe and the flange of the cone, both of which are faced, will act as a lubricant, and prevent undue wear and tear. The whole, as will be seen on inspecting the accompanying illustration, is exceedingly simple, and every part accessible. To adapt it to the present dips, all that is necessary is to face the bottom edge of the dip-pipe, and suspend a cone by a rod, which passes through the bonnet, the raising and lowering of the cone being performed through the intervention of a weighted eccentric and chain.

The Patentee will be glad to show a number of the Patented Apparatus in action, is prepared to supply them upon the most moderate rerms, and will be happy to reply to any inquiries that may be addressed as under—

W. BOX,

GAS-WORKS, CRAYFORD, KENT.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

The F. I. Co. have the exclusive right to make and sell Fraser's Patent "Ribbed" Gas-Retorts in Fire-Clay.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

Apply as above, or to the London Offices, 15, NEW BROAD STREET, E.C.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

ALFRED WILLIAMS,

PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

CLYDE TUBE WORKS, GLASGOW & COATBRIDGE.

OFFICES, 41, OSWALD STREET, GLASGOW,

ANDREW & JAMES STEWART,

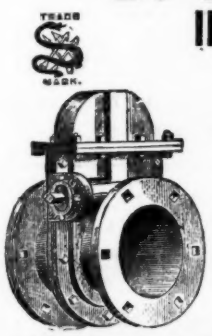
MANUFACTURERS OF
WROUGHT-IRON WELDED TUBES AND FITTINGS,
GUN METAL & OTHER COCKS, ALL KINDS OF IRON & BRASS FITTINGS
For GAS, WATER, and STEAM;
CAST-IRON PIPES, CORE BARS for IRONFOUNDERS,
STOCKS, DIES, and TAPS, GAS PLIERS and TONGS, &c., &c.,

ALWAYS KEPT IN STOCK.

LAP-WELDED IRON BOILER TUBES,

As supplied to the English, French, and Dutch Admiralties, and principal Railways and Engineers at Home and Abroad.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES



WITH WROUGHT-IRON PINIONS,

List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

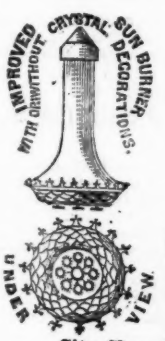
VALVES MADE WITH OUTSIDE RACKS TO ORDER.
ALSO, SCREW WATER-VALVES WITH GUN-METAL FACES.
ALSO SOLE MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS.

B. DONKIN & CO.,
GENERAL ENGINEERS AND IRONFOUNDERS,
MAKERS OF STEAM-ENGINES,
55a, BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,

MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.
A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
STREET LAMPS AND COLUMNS IN GREAT VARIETY.
WORKS: LONDON AND BIRMINGHAM.



GAS MOONS,
Cut and Engraved, of the newest designs

GAS REFLECTORS
In Silver and Glass

GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
ESTABLISHED 1830.

THE LONDON GASLIGHT COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY MEETING of the PROPRIETORS of the Company will be held at the Freemasons Tavern, Great Queen Street, Lincoln's Inn Fields, on WEDNESDAY, the 5th day of April, 1876, at Twelve o'clock precisely.

Two Directors and one Auditor retire by rotation, and, being eligible, offer themselves for re-election.

The Transfer Books will be closed on Tuesday, the 21st day of March, until after the meeting.

By order of the Board,
A. J. DOVE, Secretary.

Dated this 13th day of March, 1876.

MEMORANDUM.—Proprietors must hold capital stocks or shares paid up to the amount of £250, to be qualified to attend the meeting.

PHŒNIX GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS holding, previous to the 31st of December last, £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 5th of April, at Two o'clock precisely, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 31st of December last, to elect Directors and Auditors for the ensuing year, and other business.

The Transfer Books will be closed on and after the 22nd inst., and reopened on the 6th of April.

By order of the Court of Directors,
ISAAC ADOLPHUS CROOKENDEN, Secretary.

No. 70, Bankside, London, S.E., March 11, 1876.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is hereby given that an EXTRAORDINARY MEETING of the SHAREHOLDERS of the above Company will be held at the Offices of the Company, No. 60, Cornhill, London, on TUESDAY, the 11th day of April next, at Two o'clock in the afternoon, for the purpose of authorizing the issue of 1800 Shares of £5 each (being the balance of the unissued capital of the Company, under the Colonial Ordinance, No. 21, of the year 1870), as Preference Shares, bearing 8 per cent. per annum Dividend, with power to the holders thereof to convert such Shares, in pursuance of the Company's ordinances, at any time within five years from the date of the said Meeting, into Ordinary Shares of the Company, or subject to such other terms and conditions as may be fixed by the said Meeting.

By order of the Board,
ALFRED LASS, Secretary.

60, Cornhill, London, March 11, 1876.

WINDSOR ROYAL GASLIGHT COMPANY.

THE Directors of this Company invite

TENDERS for the supply of 5000 tons of GAS COALS (unscreened), to be delivered free at the Windsor Station of the Great Western Railway, such Coals to be either of the following descriptions—viz., New Pelton, Pelaw Main, Holmside, or Wearmouth.

The Contractor to state for which Coals he tenders, as none others than those specified will be received.

The Coals to be delivered as follows—viz., April, 400 tons; May, 400 tons; June, 400 tons; July, 300 tons; August, 300 tons; September, 400 tons; October, 500 tons; November, 500 tons; December, 1876, 600 tons; January, February, and March, 1877, 400 tons each.

The Company will undertake the unloading of the trucks.

The tender to be forwarded to me on or before the 3rd day of April, 1876.

The Directors will not entertain any tender conditional on strikes, &c., or be bound to accept the lowest or any tender.

GEO. CARTLAND, Secretary.

The Gas-Works, Windsor, March, 1876.

COLCHESTER GAS-WORKS.

CONTRACT No. 1.

THE Directors of the Colchester Gas

Company are prepared to receive TENDERS for the erection of a RETORT-HOUSE, COAL STORE, SULPHATE FACTORY, and other Works.

Duplicate copies of the drawings and specification may be seen, and a form of tender, with bill of quantities annexed, may be obtained, on payment of three guineas (which will be returned when the tender, *bona fide*, shall have been received), by application to Mr. BROWNING, the Manager, at the Gas-Works, COLCHESTER, and at the Offices of Mr. G. W. STEVENSON, the Engineer to the Company, at 4, Westminster Chambers, LONDON, on and after Monday, the 20th inst., and sealed tenders must be delivered to J. B. HARVEY, Esq., COLCHESTER, the Chairman of the Gas Company, on or before Monday, the 27th inst.

The Directors do not bind themselves to accept the lowest or any tender.

BRISTOL UNITED GASLIGHT COMPANY.

SPECIFICATION AS TO SUPPLY OF COALS.

THE Directors of the Bristol United Gas-

light Company invite TENDERS for the supply of from 90,000 to 100,000 tons of GAS COALS, during the Twelve months between the 1st of May, 1876, and the 1st of May, 1877, for use at the works, situate respectively at Avon Street, St. Philip's, and Canons' Marsh, Bristol.

The Coal to be partly small and partly large or brush, and to be delivered in such monthly proportions as may be required in accordance with the season. The quality of the coals must be good, dry, and free as possible from sulphur, bats, binds, refuse, and dirt.

Full particulars required of the Coals for which tenders may be submitted, and the Directors will be glad to receive chemical analyses thereof, and any information in relation to their properties for the manufacture of gas.

Parties tendering must state the maximum quantities of either small, large, or brush Coal they will undertake to deliver monthly, and it must be understood that the Directors are to be at liberty to accept the terms offered for any lesser quantities they may think fit.

Tenders to state the prices per ton f.o.b. (port of shipment to be named), or delivered at Railway Station, Bristol, or at the Company's Gas-Works, Avon Street or Canons' Marsh, and discount for cash monthly payments.

Payment will be made in accordance with the weight (20 cwt. to the ton), as weighed upon the weigh-bridge of the Gas Company at their respective stations.

Sealed tenders to be addressed to the Chairman of Directors, Bristol United Gas Company, Canons' Marsh, Bristol, marked "Tender for Gas Coal," and delivered not later than Tuesday, the 28th of March inst.

HENRY H. TOWNSEND, Secretary.

Gaslight Offices, Bristol, March 3, 1876.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (feap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK,
CONSISTING OF
Tables, Rules, and Useful Information for Gas Engineers, Managers,
And others engaged in the Manufacture and Distribution of COAL GAS.
BY THOMAS NEWBIGGING, A.I.C.E.

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

T. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,
Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.
To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.
To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

D. M. NELSON,
48, GORDON STREET (late 135, BUCHANAN ST.),
GLASGOW,
Supplies every requisite in connexion with the distribution of Gas and Water.
Estimates and prices on application.
WOOD GRIDS for Purifiers and Scrubbers.
Cast-Iron PIPES and VALVES.
Street LAMP-PILLARS.
Patent Pipe SCREWING-MACHINES, &c.

Just published, price 10s. 6d.,
REGISTRATION OF DISTRIBUTORY PLANT.
The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.
W. J. WARNER, Engineer.
South Shields.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,
BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.
J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.
For prices, &c., apply to the Manufacturers, Messrs. GURST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.
For prices, &c., apply to the Manufacturers, Messrs. GURST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

IN THE MATTER OF
BRONNER'S GAS-BURNERS.

HENRY GREENE AND SON, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.
Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.
Also that on the 20th of April, 1875, in a suit in Chancery, before Vice-Chancellor Malins, number 1874, B 365, he obtained injunction against another defendant, in the same terms and on similar grounds.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THE THAMES BANK IRON COMPANY,
(Successors to LYNCH WHITE,)
SUPPLY FROM STOCK
CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.
All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.
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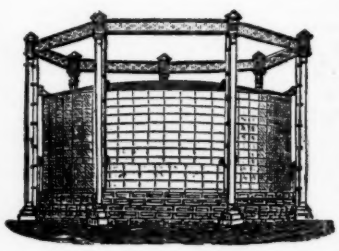
ROUND STATION-METERS, WITH CAST-IRON STANDS;
WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

SAM. CUTLER & SONS,
CONTRACTING GAS ENGINEERS,
GASHOLDER & GENERAL GAS APPARATUS MAKERS,
MANUFACTURERS OF
BOILERS, IRON ROOFING, IRON BRIDGES,
AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works,** for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs,** and every description of **Apparatus** for the Manufacture and Distribution of Gas.
Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers,** and **Purifiers,** of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**
WORKS FOR THE SUPPLY OF
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S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water,** and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.
SOLE MAKERS OF BRETT'S PATENT COKE BARROW.
Experienced Retort Setters sent to any part of the Kingdom.
Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

C. & W. WALKER,
8, Finsbury Circus,
London, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

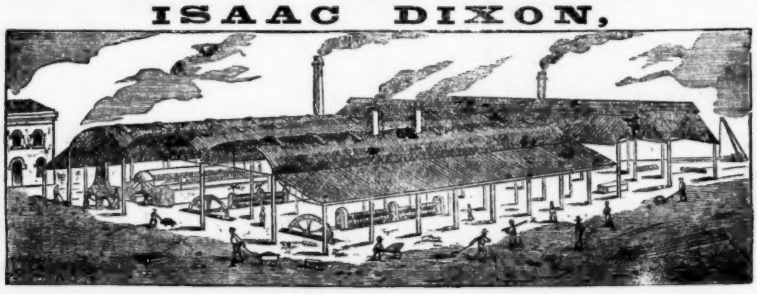
STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

ISAAC DIXON,

WINDSOR IRON-WORKS, LIVERPOOL.



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Manufacturer of SELF-SUPPORTING GALVANIZED CORRUGATED, CURVED, and every kind of IRON ROOFING, CHURCHES, SCHOOLS, SHEDS, and IRON BUILDINGS.

WROUGHT and CAST IRON GIRDERS, BRIDGES, TANKS, &c., and all kinds of WIRE WORK, FENCING, GATES, HURDLES, &c., for Home or Abroad.

DIXON'S CELEBRATED SELF-SUPPORTING IRON ROOFS are specially suitable for Forges, Rolling-Mills, Iron-Works, Shipbuilding Yards, Mines, Collieries, Gas and Water Works, and for general purposes.

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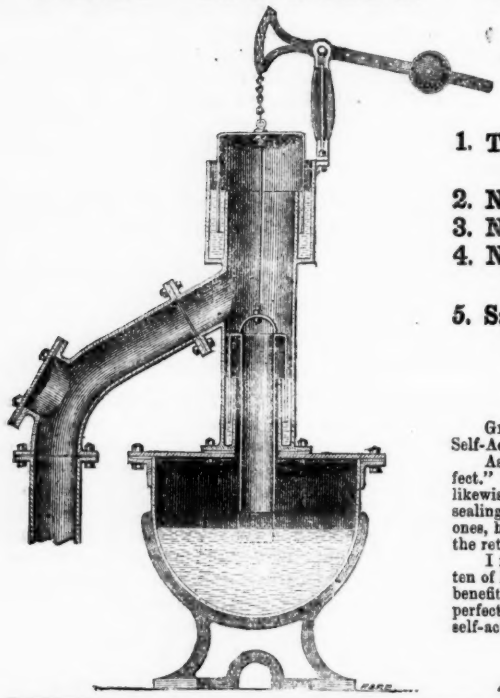
DRAWINGS, ESTIMATES, AND ILLUSTRATED CATALOGUES MAY BE OBTAINED ON APPLICATION.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Metropolitan District Asylum, Caterham, Surrey, Dec. 14, 1874.

MESSRS. CHANDLER AND STEVENSON,

GENTLEMEN,—I have much pleasure in bearing testimony to the complete working of your "Patent Self-Acting Dip-Pipes," which have now been in constant operation over three months.

As regards the action of the apparatus, I can describe it no better than by calling it "simply perfect." Immediately the retort is charged and the lid secured, the small holder rises, which lifts the Dip; likewise the instant the gas is permitted to escape at the mouthpiece the holder falls, thus perfectly sealing the Dip. I am fully convinced of the superiority of these Self-Acting Dips over Non Self-Acting ones, having experienced the fact that stokers do occasionally neglect to unseal the Dip after charging the retort, thereby causing a waste or loss.

I feel that it is quite unnecessary for me to say more on the subject, excepting that, having had ten of Messrs. Chandler's Dip-Pipes in use more than one year, and having experienced the great benefits derived thereby, inasmuch as the yield of gas from the coal is greatly increased, and the retorts perfectly free from carbon and other advantages, and seeing that the same Dip has been made perfectly self-acting by the second patent, I feel convinced that this is the right thing.—Yours obediently,

W. CRICKMAY, Resident Engineer.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

4, WESTMINSTER CHAMBERS, VICTORIA STREET. S.W.

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Gas Engineers, Patentees, and Contractors, Triennial Contractors to Her Majesty's Government,

UNDERTAKE THE

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PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

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IRONFOUNDERS,

WORKS:

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SIZES: ¾ to 12 inches at GLASGOW.

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SZERELMEY Liquid Enamel, for Iron-work exposed to the atmosphere, supersedes paint, dries in two hours, absolutely prevents rust, contains no oil, requires no mixing, is ready for use, is laid on like paint, covers new or old iron or wood, old paint, tar, or whitewash, is waterproof, gives a fine polished surface, and costs scarcely one-fourth as much as paint—namely, one halfpenny per square yard. Samples to any address for 12 stamps. Particulars free on application.

SZERELMEY Iron Paint has stood the test of 24 years experience. The gilding on the Victoria Tower of the Houses of Parliament was laid on over it upwards of 20 years ago, and is still in perfect condition.

SZERELMEY Stone Paint thoroughly waterproofs brick and other walls without giving them the appearance of having been painted.

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NONE of the Szerelmey compositions contain white or red lead, arsenic, or any other injurious ingredient. When in use and while drying they have a purifying effect on the atmosphere.

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SHIPPERS will receive liberal treat- ment at our hands. They will find that our Enamel Paste can be supplied for shipment at a price with which no ordinary paint can compete.

SZERELMEY Debentures.—Investors desirous of subscribing for the remainder are requested to intimate their intention as early as possible. The debentures will be dated Jan. 1, 1876; from that date interest at 8 per cent. per annum (for which coupons are attached) will be paid quarterly. No prospectus will be advertised, but full particulars will be sent in reply to any application addressed to N. C. SZERELMEY AND COMPANY, Limited, 24, City Bank Chambers, Threadneedle Street, LONDON, E.C.

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(ESTABLISHED 1851.)

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These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Waggon Works, and the Paint Trade generally. They are the BEST PROTECTORS of IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to ironwork. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

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Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
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Imperial Stone.	Light Stone.
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Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
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All other Colours made to order.

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STATION-METERS, GOVERNORS,

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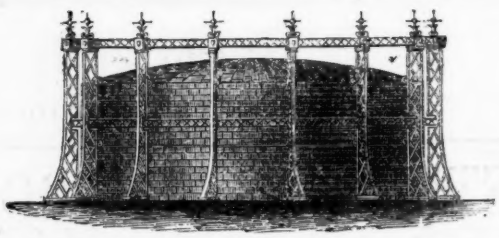
LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.



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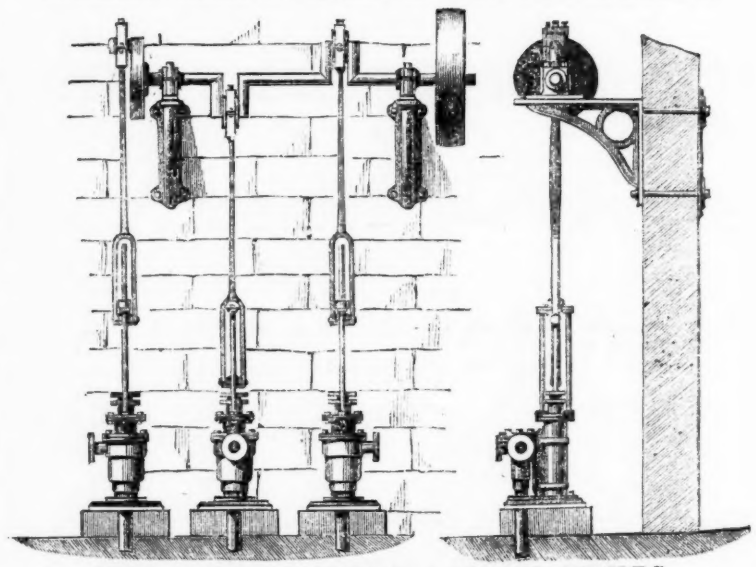

IMPROVED DOUBLE-ACTION PUMPS.
For Water. For Tar. For Ammoniacal Liquor.

This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction.

These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.

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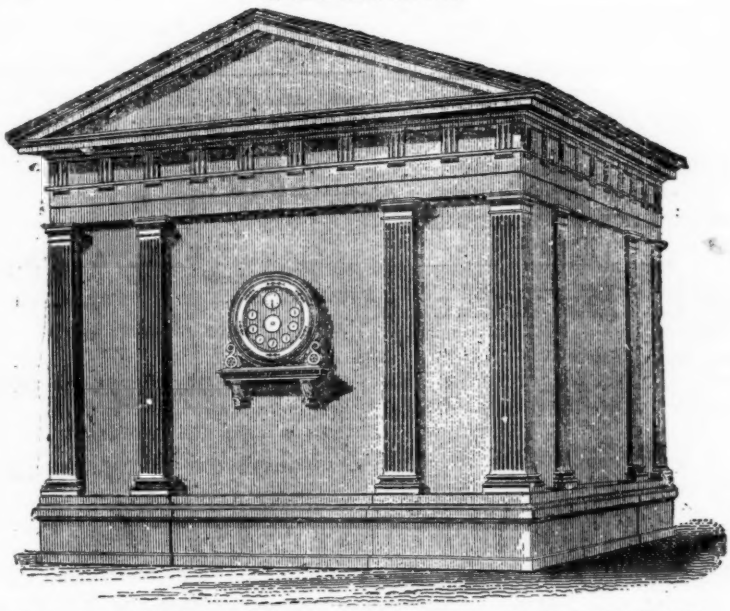
WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

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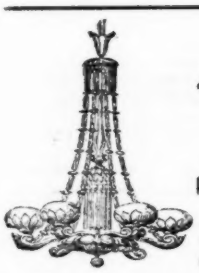

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TABLE GLASS OF ALL KINDS.

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GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

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RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.

FUEL-MACHINE, for Compressing Breeze and Tar.

WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

WATER-MAINS.

COTTERILL'S PATENT STEEL TUBE-DRILLS, for connecting services to water-mains, *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.

Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Keep in London and at their works large stocks of PIPES and CONNEXIONS (½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

CHARLES HORSLEY, Agent.

INTERNATIONAL EXHIBITION, 1862.

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For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

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THE ORIGINAL MANUFACTURER OF

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FOR

GAS PURIFIERS & SCRUBBERS.

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MANUFACTURERS OF

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GASHOLDERS,

CAST & WROUGHT IRON GASHOLDER-TANKS,

CONDENSERS, SCRUBBERS, & PURIFIERS.

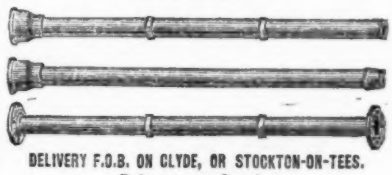
LONDON: 8, FINSBURY CIRCUS, E.C.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

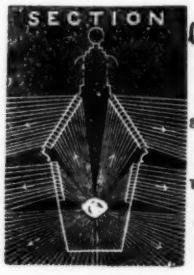
18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B. ON CLYDE, OR STOCKTON-ON-TEES.

Prices on application



THE PATENT

CATOPTRIC LAMP

Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
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Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

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This Coal yields 11,000 cubic feet of gas and 13½ cwts. of coke per ton.
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Supply and Contract for all the principal Scotch Cannel Coal (including BOGHEAD, HARTHILL, RIGSIDE, CHAPELSIDE, LESMAHAGOW, and BRAEHEAD), f.o.b., or delivered at home or abroad.
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SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;
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Cubic Feet.	Illuminating Power.	Use (sup. qual.).
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Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
Ports of shipment—Birkenhead or Connah's Quay.
Waggons supplied for delivery by railway to any part of England or Wales.
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HEBBURN MAIN GAS COALS.

Cubic feet of Gas yielded per ton . . .	10,050
Illuminating power in sperm candles . .	15·4
Yield of coke per ton of good quality . .	13¾ cwts.

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PLUTONIC CEMENT
For Repairing and Jointing Gas-Retorts, and preventing porosity,
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NEAR SHEFFIELD,
STRONGLY RECOMMEND A TRIAL OF THEIR
CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

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CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

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THE DERBYSHIRE

SILKSTONE COAL COMPANY, LIMITED,

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GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

THE LOCHORE AND CAPLEDRAE CANNEL COAL COMPANY, LIMITED.

Works: LOCHORE by LOCHGELLY, FIFESHIRE. Office: CUSTOM HOUSE CHAMBERS, LEITH.

This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.		Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	..	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	..	34·83
Value of 1 cubic foot of gas in grains of sperm	780	..	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	..	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	..	71 minutes.
Gravity of the gas (air = 1000)	596	..	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.		Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	..	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	..	33·09
Value of 1 cubic foot of gas in grains of sperm	878	..	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	..	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	..	67 minutes.
Gravity of the gas (air = 1000)	677	..	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company.

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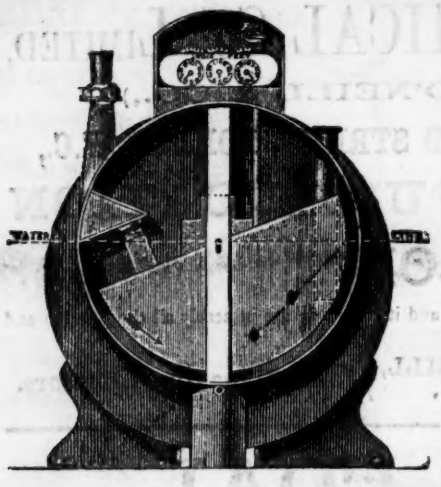

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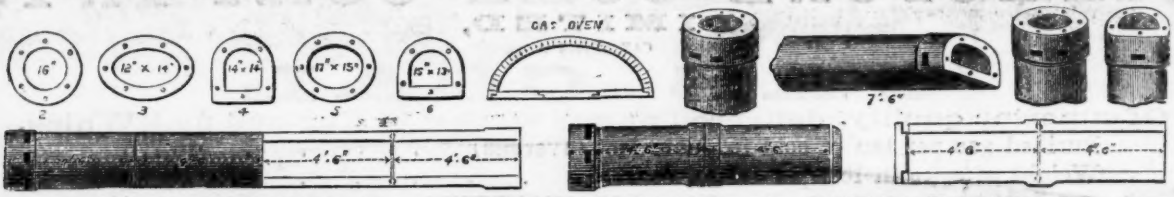

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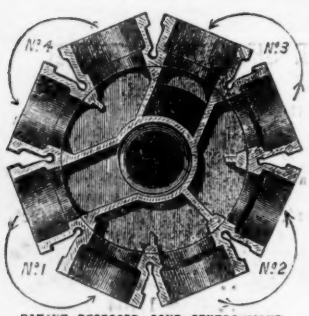

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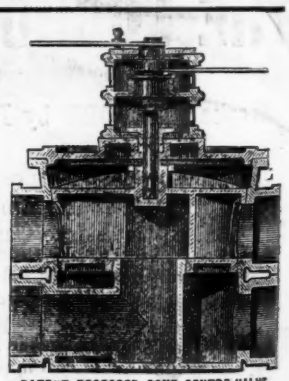

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